ADVANCING MANUFACTURING

IN CONTRA COSTA COUNTY

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WORKFORCE Development Board
Contra Costa County
Building Futures

Advancing Manufacturing in Contra Costa County

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Executive Summary

According to conventional wisdom, "we don't make things in America anymore." But this is not completely true. "Made in the USA is making a comeback. Climbing out of the recession, the U.S. has seen its manufacturing growth outpace that of other advanced nations, with some 500,000 jobs created in the past three years. It marks the first time in more than a decade that the number of factory jobs has gone up instead of down. American workers are busy making things that customers around the world want to buy — and defying the narrative of the nation's supposedly inevitable manufacturing decline."[1]

America's competitive advantage lies not in low skilled, labor intensive activities vulnerable to off-shoring, but in manufacturing that leverages advanced skills, technologies, and creativity. To capitalize on these trends toward advanced manufacturing, America needs to draw on the same competitive advantages that fueled manufacturing growth in the past -- process improvements, product innovation, and a deep pool of skilled workers -- to thrive in a new era of global manufacturing.

While the number of U.S. manufacturing jobs has declined over the past 10 years, manufacturing output has continued to grow. According to the Bureau of Labor Statistics, the U.S. enjoyed a steady growth of manufacturing jobs from the end of the Depression until the early 1980s, when the number of jobs dropped slightly and remained relatively flat until about 1999. From 1999 to 2009, U.S. manufacturers lost so many jobs that they erased almost all the gains of the previous 70 years as manufacturers substituted capital for labor, or jobs were off-shored to lower-cost production areas in order to remain competitive. Today there are far fewer people on the factory floor, far greater use of technology, and very different demands placed on the workers. *While employment in the U.S. manufacturing sector has contracted sharply since the early 1980s, employment in high-skill manufacturing occupations has risen by an impressive 37%.*

Locally, manufacturing is important to Contra Costa County's economy, employing more than 16,680 workers, making it the 7th largest employment sector with average wages well above the median household income. In 2012, the manufacturing sector accounted for 30% ($20.3 billion) of the county's overall Gross Regional Product of $67 Billion.

Contra Costa County has a diversified manufacturing base with major subsectors in Food Processing, Petroleum Refining, Life Sciences, Metal Processing & Fabrication, and Electronic Components. These five subsectors employ approximately 13,444 workers, accounting for 78.5% of all manufacturing employment in Contra Costa County.

Projected Job Openings

Several of the county's manufacturing subsectors are mature industries and should not be expected to generate significant new job growth. The number of replacement jobs, on the other hand, is significant as the county's aging workforce creates openings due to older

[1] Time Magazine, "How Made in America is Making a Comeback", April 11, 2013

workers retiring. The aging workforce creates both challenges and opportunities for manufacturing firms in recruiting and training younger workers with advanced skills. Unfortunately the younger generation has not viewed manufacturing as a viable career choice and vocational education courses have evaporated due to a lack of demand and budget cuts.

While Contra Costa manufacturing employment in general is projected to decline over the next five years, several subsectors are expected to show net new job growth. In addition, advanced manufacturing companies across all subsectors anticipate employment growth of approximately 861 new jobs over the next 3-5 years. A survey of local advanced manufacturing firms conducted in late 2012 and early 2013 found that most advanced manufacturing companies expressed plans to grow their business. When advanced manufacturing firms were asked about how many employees they expected to have working in 6-12 months, staffing levels were up about 2.5%. Compared to manufacturing firms in general, which are not growing in their employment, advanced manufacturing firms are growing and hiring new employees. Advanced manufacturing firms in most subsectors anticipate new job growth over the next three years. Advanced manufacturing companies, in eight out of 21 subsectors, plan on employment growth that will be above the average for the manufacturing sector as a whole. The three fastest growing subsectors include Electrical Equipment & Appliances (71.2%), followed by Digital and Electronic Devices & Components (33.4%) and Polymers & Coatings (18.8%). The three subsectors that anticipate the largest number of new jobs over the next three years include Digital and Electronic Devices & Components (484 jobs), Metal Processing & Fabrication (131 jobs), and Polymers & Coatings (95 jobs).

In addition, there is expected to be a significant number of replacement job openings in both traditional and advanced manufacturing firms as the baby boom generation retires. Approximately 2,900 replacement jobs are projected to open up over the next five years. Most occupational categories are expected to have openings and employers will face challenges in finding enough skilled workers to fill these replacement jobs.

Difficulty Finding A Skilled Workforce

Advanced manufacturing firms responding to the survey identified a number of occupations for which they have significant difficulty finding qualified workers. These priority occupations reflect the presence of skilled labor shortages, skill gaps, or training program deficiencies. The priority occupations identified by employers need to be priority occupations for workforce and economic development organizations as well.

Manufacturers also report that they experience difficulty finding qualified workers with basic academic and technical skills. All manufacturing workers need adequate foundational competencies like math, science, reading comprehension, and writing, along with strong workplace competencies like computer literacy, teamwork, and critical thinking. Finding workers with these basic foundational skills and workplace competencies has been a challenge for many employers.

On top of these basic skills, workers may then need further education and training for specific skills related to the particular manufacturing subsector or occupation. Employers

are having a difficult time finding workers with strong technical competencies in a number of occupations. Workers with advanced skills are also in high demand and are critical to a company's survival or growth prospects.

Training

Policy research shows that "sector training" programs that link workforce training opportunities to in-demand occupations in growth industry sectors can have substantial impacts on the employment prospects and earnings of those who participate in training.

Overall, 72% of the employers surveyed said that they believe there is a need for new or more effective pre-employment (or soft skills/work readiness) training.

Most manufacturers think that "public investment in education and training" should include providing teens and young adults with more opportunities to learn work readiness skills, to cultivate a good work ethic, and to have opportunities to explore skilled trade crafts through shop classes, vocational training programs, and work experience opportunities.

Most employers responding to the survey were also interested in job-specific training for their company or subsector that would address their workforce needs.

Recommendations

1. Target veterans through outreach and by working collaboratively with veterans' organizations as veterans offer both foundational and technical skills needed by the manufacturing sector
2. Convene a Skills Panel (with sub-panels for the five key subsectors) to assess the Priority and Demand Occupations and their need for new or improved local training programs
3. Collaborate with educational and business/industry partners to provide Pre-Employment and Certificated Work Readiness Training to address employability and foundational skills
4. Focus training resources on key manufacturing subsectors and on Priority and Demand Occupations and career pathways leading to those occupations
5. Expand business outreach and engagement activities and knowledge base of service-providing WDB and One-Stop Center staff to improve their understanding of the manufacturing sector's workforce needs and business characteristics
6. Improve the promotion and marketing of WDB, SBDC, and One-Stop Centers so that business and industry has a better understanding of the services available to employers
7. Collaborate with educational and business/industry partners to promote to the younger generations an awareness of career pathways in manufacturing, including STEM careers

Introduction

Manufacturing Sector Trends

The U.S. Manufacturing Sector is undergoing a dramatic transformation that has profound implications for the incumbent workforce and for the new workers that employers demand. Modern manufacturing facilities bare little resemblance to the traditional factory of previous decades. "In the past manufacturing has had an unfavorable image of dangerous, assembly line jobs in unsanitary environments. Modern manufacturing is changing. With advances in technology and robotics there are fewer production positions available. More manufacturing jobs require advanced technical skills and higher levels of education. As manufacturing moves further into computer-controlled automation, more workers will need computer skills. Even entry-level positions in warehousing need computer literacy."[2]

Manufacturing workers today require advanced academic, workplace, and technical skills to enable their employers to stay competitive in a global marketplace. Employers face recruitment challenges since fewer workers, especially the younger generations, are not considering careers in manufacturing. Even as overall employment in the manufacturing sector has declined, many employers report difficulty finding and hiring the highly-skilled employees they need. *While the U.S. manufacturing sector has contracted sharply since the early 1980s, employment in high-skill manufacturing occupations has risen by an impressive 37 percent.*[3]

To remain strong, our economy requires an advanced, globally competitive manufacturing sector that invents and makes high-value-added products and leading-edge technologies, here at home.

Advanced Manufacturing Portal

www.manufacturing.gov

Global Labor Markets

The increasing use of technology and rising productivity has led to declining employment as manufacturers' substitute labor for capital equipment and technology. With the decreasing need for large and extensive labor pools, cheap labor as a factor in locating a business becomes far less of a critical factor and refocuses the need for technological innovation and product development to drive business growth and competitiveness.

Cheap labor as described by Michael Porter in *"The Competitive Advantages of Nations"* is a lower-order advantage that is easy to imitate. Low cost labor means that competitors can readily duplicate such advantages by finding another low-cost location, usually an overseas labor market. China, Vietnam, and Bangladesh are just a few of the many countries that offer significantly lower labor costs than the United States and are now leveraging their competitive advantage (i.e. cheap labor). The U.S. can compete, but must reestablish its comparative advantage based upon research and development and innovation supported by advanced manufacturing.

[2] California Employment Development Department, "Manufacturing Careers", March 2007
[3] Federal Reserve Bank of New York, "A Leaner, More Skilled U.S. Manufacturing Workforce", February/March 2006

Types of Manufacturing Activities

The manufacturing sector comprises establishments engaged in the mechanical, physical, or chemical transformation of raw materials, substances, components, and parts into intermediate products and finished goods. Manufacturing also includes the assembly of component parts into new products. While production activities are a core function, manufacturing establishments also employ a wide variety of occupations from research and development, engineering design, logistics, quality control, and maintenance to administrative operations (accounting, payroll, HR, and management) and sales and marketing. This diverse range of occupations is all part of a manufacturing firms operation.

Advanced Manufacturing

The U.S. Department of Labor's Employment and Training Administration defines advanced manufacturing as "the accelerated use of high-tech processes in the manufacturing plant."

Advanced manufacturing technologies can both revitalize existing manufacturing industries and support the development of new products in emerging industries.

According to the President's Council of Advisors on Science and Technology "advanced manufacturing is a family of activities that (a) depend on the use and coordination of information, automation, computation, software, sensing, and networking, and/or (b) make use of cutting edge materials and emerging capabilities enabled by the physical and biological sciences, for example nanotechnology, chemistry, and biology." [4]

Over the past few decades, manufacturing has evolved from a more labor-intensive set of mechanical processes (traditional manufacturing) to a sophisticated set of information-technology-based processes (advanced manufacturing). As manufacturing advances, it is increasingly becoming more knowledge-intensive, relying on information-technologies to improve performance and reduce waste.

Advanced Manufacturing is not a separate industry or subsector. It simply employs new ways to manufacture existing products as well as manufacture new products emerging from advanced technologies. Firms employing advanced manufacturing processes can be found in both traditional and new emerging industries.

In order to succeed in today's highly competitive global economy, manufacturing firms are increasingly adopting advanced manufacturing technologies and process improvements, especially when they are cost effective and lead to lower cost and increased productivity, as a way to create a competitive advantage. A distinguishing characteristic of advanced manufacturing is the use innovative technologies, processes, or materials in product design and production processes.

"The Advanced Manufacturing entity makes extensive use of computer, high precision, and information technologies integrated with a high performance workforce in a production system capable of furnishing a heterogeneous mix of products in small or large volumes with both the efficiency of mass production and the flexibility of custom

[4] Report to the President on Ensuring American Leadership in Advanced Manufacturing

manufacturing in order to respond quickly to customer demands." (Quoted in President's Council of Advisors on Science and Technology Report) *Paramount to Advanced Manufacturing is a highly skilled workforce operating in lean and continuous improvement cultures.*

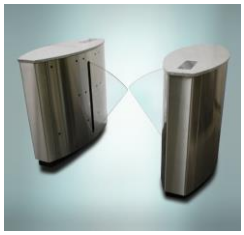
Manufacturing Matters

While manufacturing employment nationwide has declined over the past several decades, the U.S. is still a global leader in manufacturing and economic development strategies recognize its continued importance especially in the context of regional income, wages, and innovation. Most manufacturers export their products outside a region, to another state or country, so that new dollars are brought into the local economy. This has a multiplier effect as manufacturers purchase materials and services from local businesses thereby supporting jobs in other industries. Manufacturers also pay higher wages than the typical business which results in greater spending on local consumer goods and services by their employees.

Perhaps the strongest argument for manufacturing is the innovation it drives. The on-going need to improve efficiencies and respond to changing markets creates an environment in which manufacturers need to make continuous improvements in order to remain competitive. Being able to design, test, and redesign a product is at the heart of the manufacturing process that gives the United States a competitive advantage. Once production has moved overseas it is hard to bring it back and eventually research and development activities may follow.

Importance to Local Economy

Manufacturing is one of the core industries in Contra Costa County, accounting for 5.1% of all jobs with 564 firms employing 16,689 workers in 2012. Over the past ten years the manufacturing sector has shown a general decline in employment, in part due to the Great Recession of 2007-2009. Although the manufacturing sector has lost jobs over the past decade it still remains a vital part of the local economy. In general, manufacturing has been more resilient to economic downturns than the overall economy (see Figure 1) and is the County's 7th largest employment sector with average wages well above the county's median household income.

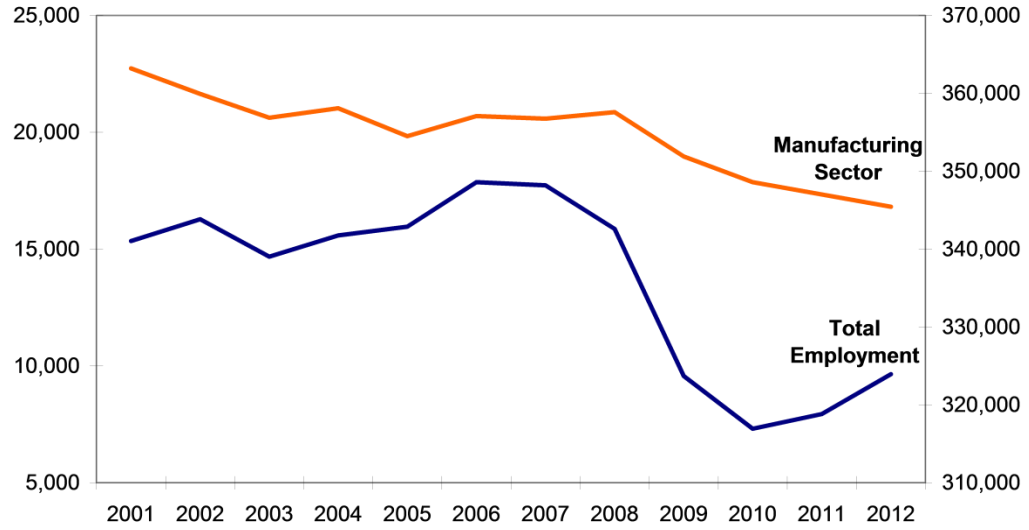


Delta Turnstiles

Concord, Contra Costa County

Delta Turnstiles is a manufacturer of high quality optical turnstiles that are used as entrance control solutions for security and facility management applications. www.deltaturnstile.com

Figure 1:
Contra Costa County Employment Trends (2001-2012)



Source: EMSI data 2013.1

Average Wage Levels

The average wage for manufacturing workers in Contra Costa County is $108,361 compared to the average wage of $59,350 for all workers in the county. In 2011, manufacturing firms in the county paid out $1.88 billion in wages, making it one of the top three sectors with the total wages paid.

Tax Revenue Generation

While industrial property constitutes less than 1% of the total taxable parcels in the county, its assessed value makes-up more than 10% of the local tax base.

Gross Regional Product

Gross Regional Product (GRP) which measures the size and productive capacity of the regional economy shows that manufacturing is a major contributor to the local economy. In 2012 the manufacturing sector contributed one-third ($20.3 billion) to Contra Costa County's total GRP of $67.0 Billion. This represents 30% of the county's overall economy.

Local Spending & Capital Investment

The manufacturing sector is also important to the local economy due to its high levels of capital investment. Annual capital spending by the manufacturing sector totaled $982.6 million in 2007. Maintenance and upgrades provide on-going construction jobs at many of the manufacturing plants, particularly the refineries. Local spending due to operating expenditures generates additional demand for goods and services, thereby creating employment in other sectors, including professional services, utilities and retail. For every job created in manufacturing, more than six indirect and induced jobs are created in the local economy.

Multiplier Effect

Manufacturing is complex and its production processes increase the demand for raw materials, energy, construction, and services from a broad array of supplying industries due to spending by manufacturing firms. According to the Manufacturing Institute the multiplier effect of manufacturing is stronger than other sectors (see Figure 2). Nationally, manufactured products support $1.48 in output from other sectors. This constitutes the largest multiplier of any sector. Contra Costa's manufacturing sector has a high jobs multiplier primarily due to the above average wages paid to workers in the petro-chemical, high tech, and life sciences subsectors.

Figure 2 – Manufacturing's Multiplier Effect Is Stronger Than Other Sectors' *(Updated November 2012)*

Source(s): U.S. Bureau of Economic Analysis, Annual Input-Output Tables

By any measure, Contra Costa's manufacturing sector is a major contributor to the local economy. High wage jobs provide workers with a livable wage well above the median. Property taxes paid and local spending by manufacturing firms support jobs in other sectors. An economically healthy and vibrant manufacturing sector therefore is important to the local economy.

Industry Analysis

Historically, Contra Costa County has served as a manufacturing center for the Bay Area and the State of California for over 100 years. While a number of industries established around the turn of the century are still here, many of the older industrial areas have been in decline and transitioning to other uses. As the county's manufacturing base contracted, manufacturing employment has declined, both in absolute terms and as a share of total employment, in part due to the structural shift in the U.S. economy and increasing global competition. Companies that adapted their production and manufacturing processes have remained competitive and increased their productivity with fewer workers. The adoption of advanced manufacturing technologies and processes would enable many local companies to remain competitive into the future.

Industry Composition

The manufacturing sector can be divided into numerous subsectors based on the type of products, material inputs, and production processes. The North American Industry Classification System (NAICS) groups manufacturing establishments according to their primary activity and the similarity in the processes used to produce goods. The production of durable goods, which typically last for more than three years are classified under NAICS 31, while non-durable goods which last less than a year are grouped under NAICS 33. Resource-based goods derived from natural substances are listed under NAICS 32.

Subsectors

For purposes of this study we have divided the manufacturing sector into 21 subsectors based primarily on their 3-digit NAICS codes. Each manufacturing subsector not only reflects differences in the type of products, material inputs, and production processes, but also the type of occupations that are required.

As you can see from the following table, Contra Costa County has a diversified manufacturing base with 564 firms spread across 21 subsectors (or 20 subsectors, plus one additional category for "miscellaneous"). Heavy manufacturing (i.e. petroleum refining, chemicals, and steel processing) has been the county's traditional manufacturing base, while new industries such as a biotechnology and cleantech have recently emerged over the past several decades.

Hero Arts

Richmond, Contra Costa County

Hero Arts is the top brand in the crafting market with almost 40 years of experience making premium stamps, papers and inks.
www.heroarts.com

Manufacturing Subsectors

	Subsector	# Firms	# Jobs	Projected Job Growth	LQ	Job Multiplier	Wages
1	Food & Beverage	60	1,860	23.1%	0.49	2.63	$ 51,781
2	Apparel, Textiles & Leather	18	187	-16.5%	0.23	1.43	$ 59,907
3	Wood & Paper	21	321	13.8%	0.17	1.63	$ 39,806
4	Printing	63	424	-11.1%	0.42	1.44	$ 49,428
5	Petroleum Refining & Products	24	6,721	-10.3%	24.77	7.41	$ 178,901
6	Industrial, Agriculture & Household Chemicals	31	516	-25.0%	0.64	2.98	$ 78,818
7	Polymers & Coatings	3	55	-33.0%	0.10	1.90	$ 95,876
8	Life Sciences	56	1,326	-2.3%	0.90	2.61	$ 67,565
9	Plastic & Rubber Products	10	54	-56.0%	0.04	1.48	$ 54,311
10	Building Materials	25	329	-37.5%	0.44	1.83	$ 56,621
11	Metals	78	1,841	-0.8%	0.44	2.58	$ 67,267
12	Machinery (except ECS and Power Generation)	28	473	-0.2%	1.68	1.70	$ 73,086
13	Environmental Control Systems	5	48	-33.0%	0.18	1.67	$ 70,730
14	Power Generation Equipment	-	-	-	-	-	$ -
15	Digital & Electronic Devices & Components	47	1,564	-15.3%	0.58	1.66	$ 85,504
16	Electrical Equipment & Appliances	14	151	-41.6%	0.16	1.81	$ 72,360
17	Battery Storage	1	1	0.0%	0.01	1.38	$ 34,720
18	Transportation (except aerospace)	12	60	-65.9%	0.03	1.52	$ 40,482
19	Aerospace	1	7	35.5%	0.00	1.49	$ -
20	Furniture	40	499	0.4%	0.66	1.48	$ 50,150
21	Misc Manufacturing (except medical devices)	27	252	4.1%	0.36	1.32	$ 38,902
	Total Sector	**564**	**16,689**	**-5.4%**	**0.60**	**7.40**	**$ 108,361**
	% Total Employment		5.1%				
			326,246				

Source: EMSI Covered Employment - 2013.1

Top Five Manufacturing Subsectors

The top five manufacturing subsectors in Contra Costa County based on employment levels include:

1. Petroleum Refining & Products
2. Food & Beverage Processing
3. Metal Processing & Fabrication
4. Digital & Electronic Devices and Components
5. Life Sciences

Number of Establishments

The number of manufacturing firms in Contra Costa County has declined over the past several decades, as has the number of manufacturing jobs. The surviving companies have become more efficient due to the adoption of advanced technology and business process improvements. In 1992, Contra Costa County had 928 manufacturing establishments employing more than 27,200 workers. By 2002, there were only 793 manufacturing establishments and by 2012 the number of establishments was down to 564 firms employing 17,130 workers. New business formations in the manufacturing sector have been rather limited. According to a recent report on the East Bay economy "*. . . business starts in manufacturing [in the East Bay] play a smaller role than in the broader economy. It is instead growth at established firms that provides the bulk of job creation.*"[5]

Size of Firms

The county's manufacturing sector is made up primarily of small firms with 62.2% having fewer than 10 employees. Firms with 10-49 employees account for approximately

[5] East Bay Economic Development Alliance, "Building on Our Assets: Economic Development and Job Creation in the East Bay", October 2011

27% of all manufacturing firms while medium size firms with 100-499 employees' make-up 4% of the companies. Large firms with 500 or more employees make up less than 2% of all manufacturing firms in Contra Costa County.

Large manufacturing firms are prominent in mature subsectors such as petroleum refining, chemical processing, and steel fabrication, while small and medium sized firms are spread across all subsectors. Smaller firms which enter the market and grow successful are the primary engine of new job growth. Between 1997 and 2007 the number of jobs in large manufacturing firms declined by 19.9% while the number of jobs in small manufacturing firms increased by 14.6%. However, the job growth in small firms has not been sufficient to offset the overall loss of employment in the manufacturing sector, in part because of the limited number of new start ups in high growth subsectors. Small innovative manufacturing companies in high-tech industries (drugs, computing, communication equipment, and scientific instruments) with high growth rates like in other parts of the Bay Area are not the norm here in Contra Costa County. Even subsectors with employment growth showed a decrease in the number of small firms between 2001 and 2011, except wood products.

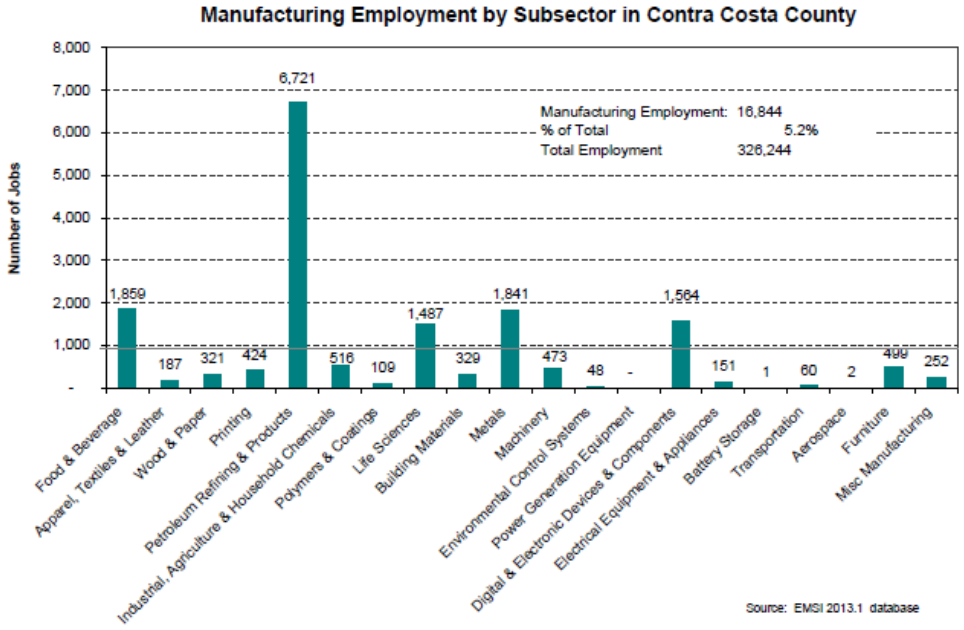
Number of Companies by Size of Firm

	Size of Firm (number of employees)								
	1-4	**5-9**	**10-19**	**20-49**	**50-99**	**100-249**	**250-499**	**500-999**	**1000+**
# Firms	234	112	87	69	25	17	5	5	2
% Total	42.1%	20.1%	15.6%	12.4%	4.5%	3.1%	0.9%	0.9%	0.4%

Source: County Business Patterns

Employment

Although Contra Costa County has a diversified manufacturing base, several key subsectors dominate. Heavy industry with petroleum refining, petro-chemicals, and metal processing and fabrication makes up the largest group of manufacturing employment. Other major subsectors include high tech, food processing, and life sciences. The top five manufacturing subsectors employ approximately 13,444 workers, accounting for four out of every five (78.5%) manufacturing jobs.



Growth Trends

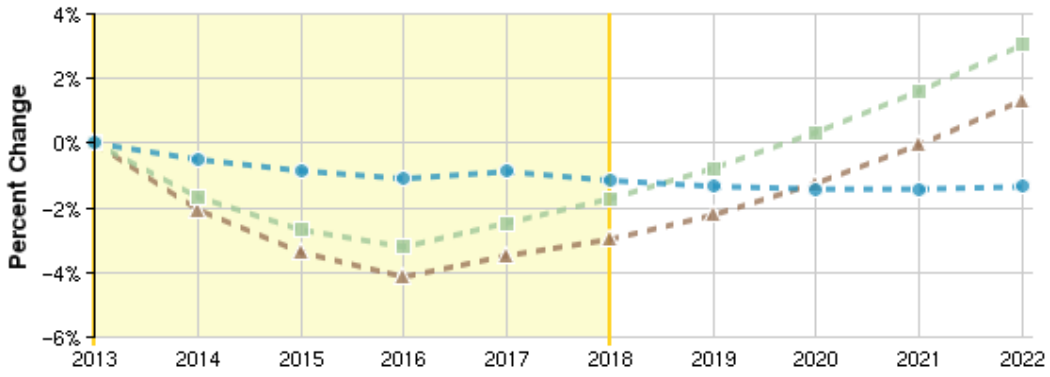
In the early 1990s, manufacturing was a key driver of the local economy accounting for 12% of the county's private sector employment. Over the past several decades, employment in the county's traditional manufacturing sector has contracted, dropping to 8% of private sector employment in 2000 and 6.7% in 2010. Although some subsectors have maintained a strong local presence, the county's manufacturing sector in general has greatly diminished in size since the early 1990s. Companies that survived have become leaner and more efficient, producing more with fewer workers. Value added by manufacturing during this time frame increased by 161% with 9% fewer production workers. Although manufacturing employment is down by 42% since 1990, several subsectors have shown an increase in employment since 2001, including petroleum refining, textile products, electrical equipment, printing, and medical equipment & supplies. Several of the county's manufacturing subsectors are mature industries and should not be expected to generate significant new job growth.

Over the long run, manufacturing's share of employment will remain under pressure as a result of "ongoing productivity improvements, the continued growth of services as a share of the economy, and the force of global competition, which pushes advanced economies to specialize in activities requiring more skill."[6]

[6] McKinsey Global Institute, "Manufacturing the Future: The next era of global growth and innovation", November 2012

Projected Employment Growth

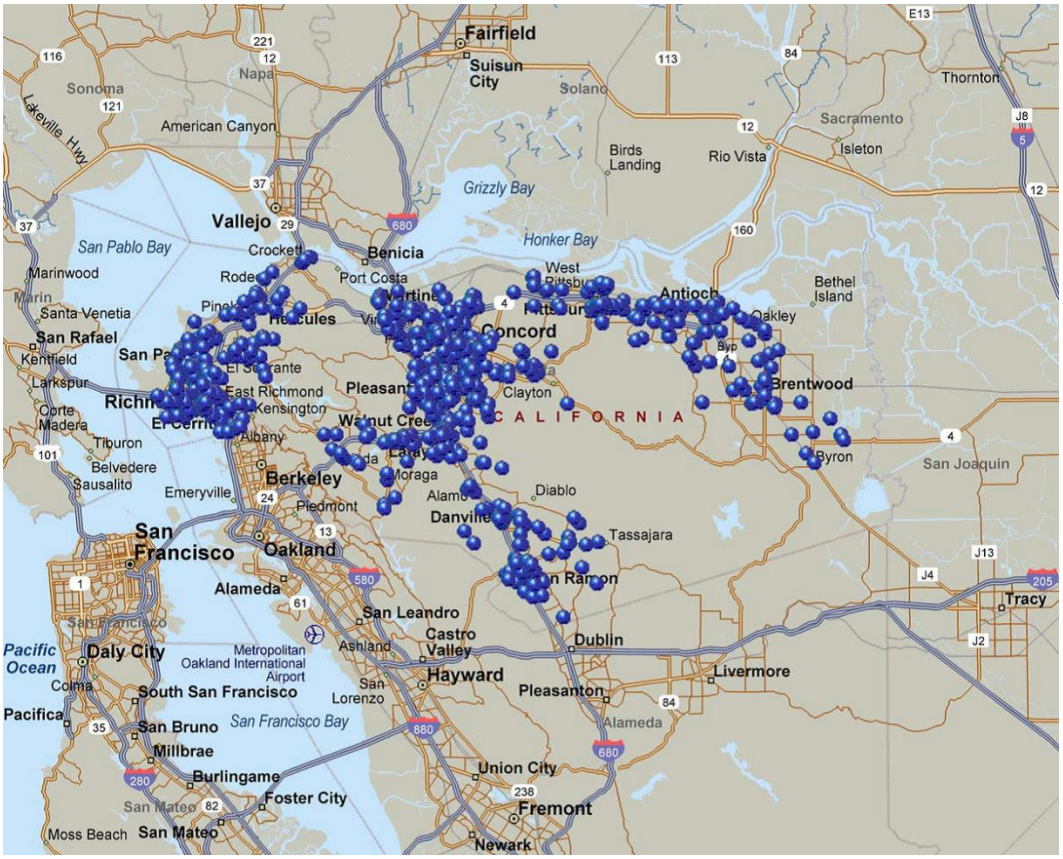
Overall the manufacturing sector in Contra Costa County is projected to shed jobs over the next five years primarily due to the mix of industries. National and State trends also show a decline in manufacturing employment through 2016, but then begin to pick up, while Contra Costa manufacturing employment continues to decline, albeit at a slower pace than in the recent past. The county will outperform the nation and state between 2013 and 2018, like it has over the past 10 years, but continues a downward trajectory as the manufacturing sector statewide and nationally begin to add new jobs. Several subsectors in Contra Costa County, however, are expected to show net new job growth including food & beverage, wood products, and miscellaneous manufacturing subsectors.



Geographic Distribution of Manufacturing Firms

Manufacturing firms are located throughout Contra Costa County, but principally in the western and eastern parts of the county and along the I-680 corridor in central Contra Costa. The County's northern waterfront extending from Richmond on the west through Martinez and Concord onto Antioch and Oakley in the east historically has attracted most of the manufacturing activity. The northern portion of Contra Costa County is still home to heavy manufacturing industries, especially oil refining and chemicals.

Distribution of Manufacturing Firms in Contra Costa County



Major Employers

Contra Costa's manufacturing sector includes a number of globally competitive companies. Major manufacturing firms include Shell, Chevron, ConocoPhillips, Tesoro, Dow Chemical, General Chemical Corporation, Praxair, USS POSCO, Henkel Loctite Aerospace, BEI Sensors & Systems, Giga-tronics, Bio-Rad Labs, Berkeley Process Control, MuirLab, Sun Power, and C&H Sugar. Chevron has both refinery operations as well as its corporate headquarters in Contra Costa County.

Communities with strong industry clusters, a mix of growing industries, and a skilled workforce will be at a greater competitive advantage

Major Manufacturing Employers in Contra Costa County	
Company	**Industry Subsector**
Firms with 100-plus Employees	
C & H Sugar Company	Food & Beverage Processing
Galaxy Desserts	Food & Beverage Processing
Maple Leaf Bakery	Food & Beverage Processing
Chevron Corporation	Petroleum Refining & Products
Shell Martinez Refining	Petroleum Refining & Products
ConcoPhillips	Petroleum Refining & Products
Tesoro	Petroleum Refining & Products
Bio-Rad Laboratories	Life Sciences
Fresenius USA	Life Sciences
Biocare Medical	Life Sciences
Dow Chemical Company	Polymers & Coatings
Henkel Corporation (Aerospace Material Division)	Polymers & Coatings
USS Posco Industries	Metal Processing & Fabrication
L-3 Communications Corporation	Machinery
Benchmark Electronics	Digital and Electronic Devices & Components
Parker-Hannifin Corporation	Digital and Electronic Devices & Components
Cemco Steel	Metal Processing & Fabrication
Firms with 50-99 Employees	
General Chemical	Industrial, Agriculture, & Household Chemicals
Hasa Inc	Industrial, Agriculture, & Household Chemicals
Biozone Laboratories	Life Sciences
Danville Materials	Life Sciences
Quick Mount PV	Metal Processing & Fabrication
Silgan Containers	Metal Processing & Fabrication
Bishop Wisecarver	Metal Processing & Fabrication
Shaper / Cooper Lighting	Electrical Equipment & Appliances
Criterion Catalyst	Industrial, Agriculture, & Household Chemicals
Rhodia Inc	Industrial, Agriculture, & Household Chemicals
United Spiral Pipe	Metal Processing & Fabrication
Giga-tronics	Digital and Electronic Devices & Components
QG Quality Graphics	Printing
Acme Press	Printing
Design Veronique	Life Science
American Reprographics	Printing
Ramar Foods	Food & Beverage Processing
Source: InfoUSA	

Competitive Strengths

Competitive advantage occurs when a region enjoys a combination of attributes; such as access to natural resources, inexpensive power, or a highly trained and skilled workforce that allows it to outperform other economies. Historically, Contra Costa County's northern waterfront provided access to water transportation for shipping, inexpensive land, and cheap labor. Contra Costa was able to capitalize on these assets with giant resource intensive plants processing explosives, chemicals, oil, sugar, cement, lumber, silver, lead, and steel - making it one of the State's leading manufacturing centers in the early 1900's.[7] In 1962 almost 40% of the County's workforce was employed in the manufacturing sector. Today less than 6% of the workforce is employed in manufacturing. [8]

While these trends are daunting, the County's manufacturing sector shows competitive strengths in several subsectors. To evaluate the competitive strength of the county's manufacturing subsectors, location quotients were used to identify local strengths, opportunities, and potential industry clusters. Location quotients (LQ) measure the relative concentration of an industry within a region compared to the same industries in the national or state economies. LQs greater than 1.0 denote a higher-concentration of employment for an industry within a region than the national or statewide average which may indicate a possible competitive advantage. A location quotient greater than 1.25 is also an indicator that the industry is producing more than can be consumed by the local economy and is serving a larger export market. These export oriented industries bring new dollars into the local economy, typically pay higher wages, and support employment growth.

Contra Costa County's manufacturing sector is relatively weak with employment concentrations below the national average and declining employment in most subsectors. Key subsectors in which the county has a comparative advantage include petroleum refining and food and beverage processing. Contra Costa County is also strong in primary metals products, life sciences, and petro-chemicals when compared with statewide averages.

Ready Print

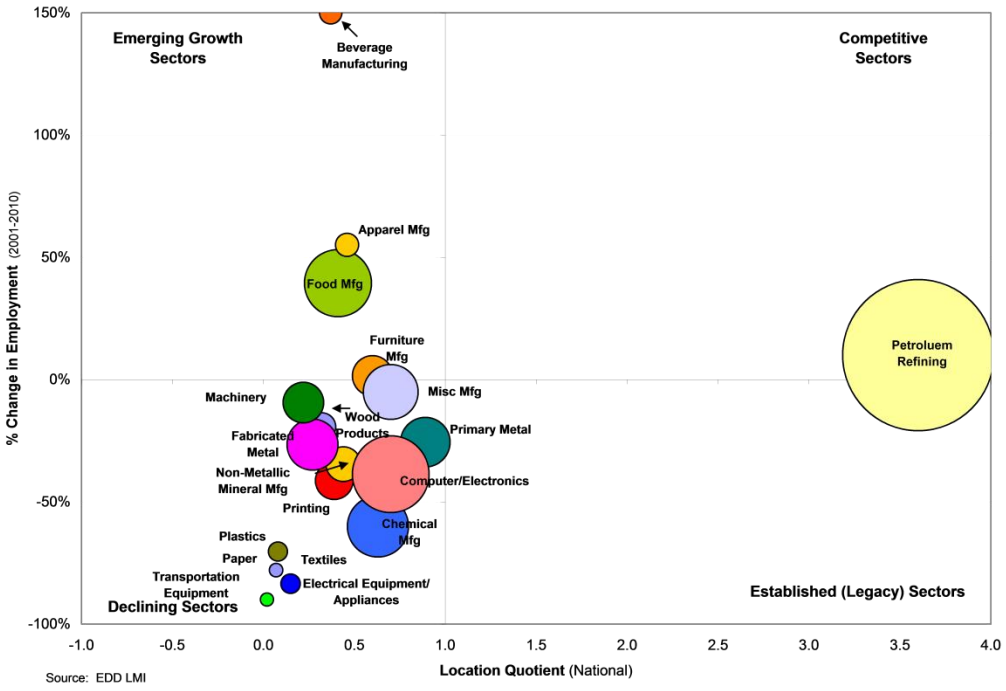
Pittsburg, Contra Costa County

Ready Print uses old-fashioned customer service and new technology to meet all of their customers' print and marketing needs.

www.readyprint.com

[7] Walker, Richard A., "Industry Builds Out The City: The Suburbanization of Manufacturing in the San Francisco Bay Area 1850-1940", Department of Geography, University of California, Berkeley, 2004

[8] Contra Costa Economic Partnership, "Major Drivers of Contra Costa County's Economy: Dealing with Global Competition and Accelerating Change", January 2008



Regional Performance

Shift-share analysis is used to determine how much of an area's employment change is due to the national economy, the mix of industries, and to local competitiveness.

Shift-share analysis identifies a region's most competitive industries by comparing employment changes in each industry of the local economy to employment changes in the same sector of the national economy. When employment in a local industry grows at a faster pace (or declines less) than its counterpart nationally, a shift occurs in the proportion of employment captured by that industry locally, changing the region's competitive position.

To determine whether the growth (or decline) in local manufacturing employment was attributable to growth of the national economy, industry trends at the national level, or some local competitive advantage, a Shift-Share Analysis was conducted.

During the period 2001 to 2012, manufacturing employment in Contra Costa County declined by 5,924 jobs. If the local economy had grown (declined) at the same rate as the national economy, Contra Costa County would have added 300 new jobs. At the same time, the manufacturing sector at the national level did not perform well, but did perform better than the mix of industries in the manufacturing sector at the local level. If the industry composition had been the same locally as nationally, then the county's economy would have lost fewer manufacturing jobs. Accounting for this difference was the fact that Contra Costa's industries experienced a higher rate of job loss and underperformed the mix of industries nationally.

Shift Share Analysis 2001-2012

NAICS Code	Description	National Growth	Industrial Mix	Competitive Effect	Actual Change	Expected Change
311	Food Processing	14	-72	450	392	-58
312	Beverage	1	-3	246	244	-2
313	Textile Mills	1	-26	-6	--	-25
314	Textile Product Mills	1	-33	-18	-50	-32
315	Apparel	2	-82	121	40	-80
316	Leather and Allied Products	0	0	0	--	0
321	Wood Products	4	-144	68	-71	-140
322	Paper	4	-102	-154	-252	-98
323	Printing and Related Support Activities	11	-333	-43	-365	-322
324	Petroleum and Coal Products	90	-510	374	-46	-420
325	Chemical	41	-584	-1,370	-1,913	-543
326	Plastics and Rubber Products	5	-116	-223	-333	-111
327	Nonmetallic Mineral Product	8	-218	-47	-258	-210
331	Primary Metal	14	-348	145	-189	-334
332	Fabricated Metal Product	16	-211	-125	-321	-195
333	Machinery	8	-133	38	-86	-125
334	Computer and Electronic Product	42	-1,234	-322	-1,515	-1,192
335	Electrical Equipment, Appliance, & Components	10	-272	-358	-620	-262
336	Transportation Equipment	8	-157	-382	-531	-149
337	Furniture and Related Products	7	-251	212	-33	-244
339	Miscellaneous Manufacturing	14	-203	203	13	-189
	Total	300	-5,033	-1,191	-5,924	-4,733

Source: EMSI Covered Employment - 2013.1

Several local manufacturing subsectors that outperformed their national counterparts include petroleum refining, food & beverage processing, apparel, wood products, primary metals, and machinery.

In general, the shift share analysis shows that Contra Costa County's economy is strongly influenced by the performance of the national economy and that a large proportion of local industries are less competitive than their national counterparts.

While local factors contributed to the loss of manufacturing jobs in Contra Costa County, it does not explain why the area was less competitive. Various factors could be the cause, including less competitive companies, market decline, regulatory environment, tax policies, under-developed local supply chains, start-up challenges, and numerous other factors.

Advanced Manufacturing Cluster

Advanced manufacturing is not industry or subsector specific, although it may be more dominant in certain subsectors. Advanced manufacturing technologies and processes can be utilized by manufacturing firms in any industry or subsector.

Advanced Manufacturing Processes

Advanced Manufacturing processes, equipment, and technology is used to design and produce everything from automobiles to computer chips in response to customer demands, competitive challenges, and emerging technologies. Recent advances in information systems, business processes, engineering techniques, and manufacturing science now enable companies to produce new and better products more quickly and at a much lower cost than ever before.

Advanced Manufacturing represents a wide variety of computer-based systems which contribute to the overall improvement of manufacturing processes that enhance a firm's competitiveness. These technologies include a wide variety of processes such as computer-aided manufacturing system (CAM), flexible manufacturing systems (FMS), manufacturing resource planning (MRP II), automated material handling systems, robotics, computer-numerically controlled (CNC) machines, computer-integrated manufacturing (CIM) systems, optimized production technology (OPT), and just-in-time (JIT) delivery. They also include computer-aided design (CAD), materials resource planning, and electronic data interchange.

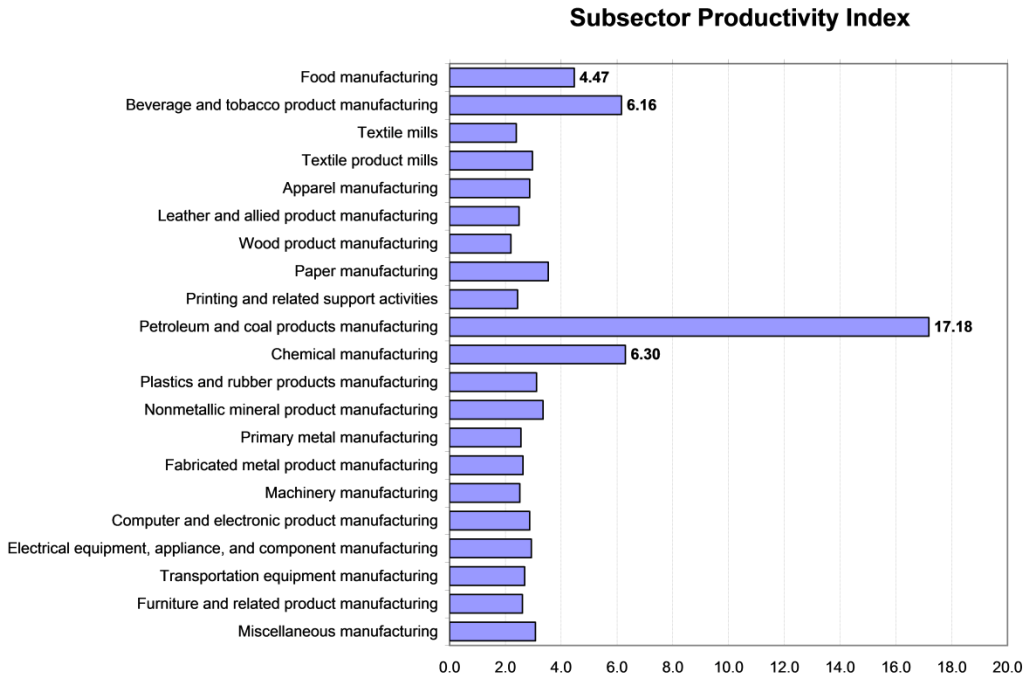
Through a coordinated production system of people, machines and tools, advanced manufacturing extends from the planning and control of the production process, through the procurement of raw materials, parts and components, to the shipment and service of finished products. Advanced manufacturing permits customization, variety, frequent design changes, and reduced lead times for design, assembly, materials handling, and market feedback. Advanced manufacturing technologies and processes also allow small firms to develop economies of scale based on low volume and low cost production.

The Advanced Manufacturing entity makes extensive use of computer, high precision, and information technologies integrated with a high performance workforce in a production system capable of furnishing a heterogeneous mix of products in small or large volumes with both the efficiency of mass production and the flexibility of custom manufacturing in order to respond quickly to customer demands.

National Council for Advanced Manufacturing

Productivity as an Indicator of Advanced Manufacturing

Manufacturing subsectors that demonstrate productivity levels higher than average is an indicator that firms in that subsector most likely employ advanced manufacturing processes and technology. While industries that produce high tech products or use advanced materials are typically considered advanced manufacturing subsectors, traditional manufacturing subsectors can also adopt advanced manufacturing technology and processes to lower their cost and increase their productivity.



In an effort to identify Contra Costa County's advanced manufacturing base, an analysis was conducted of the productivity levels for each manufacturing subsector. The analysis identified four subsectors (food & beverage processing, petroleum refining, petro-chemicals, and biotechnology) with above average productivity levels. Companies within these subsectors are more likely to employ advanced manufacturing in their production process than other subsectors. However, it is impossible to determine which companies employ advanced manufacturing processes without conducting a survey of the firms within the subsector.

Survey of Advanced Manufacturing Firms

Contra Costa County has a range of manufacturers from traditional firms to those employing advanced manufacturing processes. A survey of the manufacturing sector was conducted between December 2012 and February 2013 to identify advanced manufacturing firms in Contra Costa County and to collect information on their workforce needs. The survey included all manufacturing firms with 10 or more employees, and a sampling of firms with less than 10 employees. A database of 408 firms was developed from several sources including InfoUSA, EMSI, and Dun & Bradstreet.

The number of qualified businesses meeting our survey criteria was reduced to 208 firms after eliminating those which were inappropriate for our survey purposes (e.g. can't locate, out of business, non-manufacturing, duplicate, or no local manufacturing). A total of 131 firms participated in our survey, giving us a 63% response rate overall. Of those responding, 92 firms indicated that they were using advanced manufacturing technologies, processes or materials, and all 92 participated in our extended needs assessment survey. As a group, these 92 advanced manufacturing firms represent 16% of all local manufacturing firms.

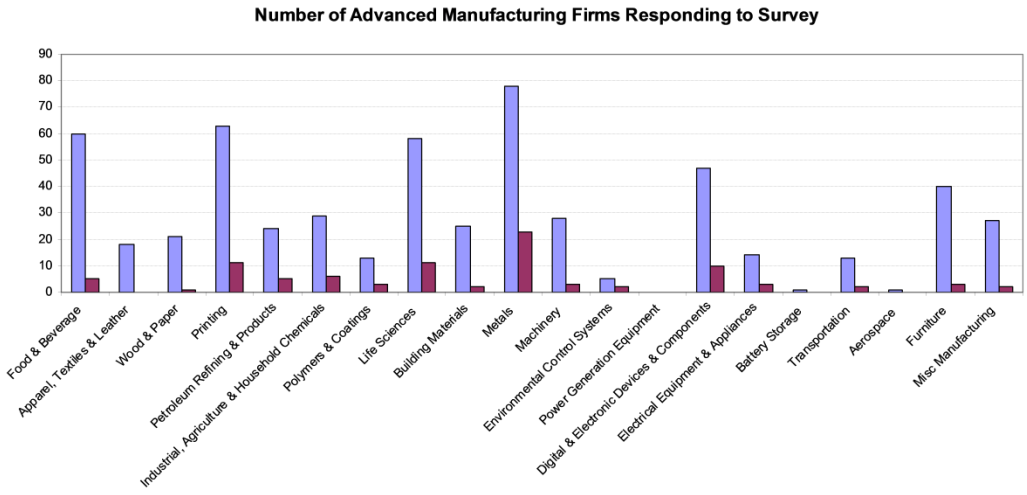
A follow-up meeting was conducted with about 1/3 of the 92 advanced manufacturing firms in order to validate the survey results and to better understand their individual and collective workforce needs.

Survey responses were aggregated to avoid identifying individual firms or survey participants. Although most of the findings from the survey have been incorporated into the narrative of this report, a detailed summary of the survey responses and a copy of the survey questionnaire are available in a separate report.

It should be noted that some of the advanced manufacturers could be classified in more than one subsector based on the firms multiple manufacturing activities. However, we elected to classify each business in a single subsector based on our understanding of its dominate activity.

In terms of the number of businesses responding to the employer survey, most of the advanced manufacturing firms were concentrated in Metal Processing & Fabrication, Printing, Life Sciences (Pharmaceuticals, Biotechnology, Medical Devices & Equipment), and Digital and Electronic Devices & Components, followed by Petroleum Refining, Petro-Chemicals, and Food & Beverage Processing. The following chart shows the number of advanced manufacturing firms responding to the survey compared to the total number of manufacturing firms in the subsector.

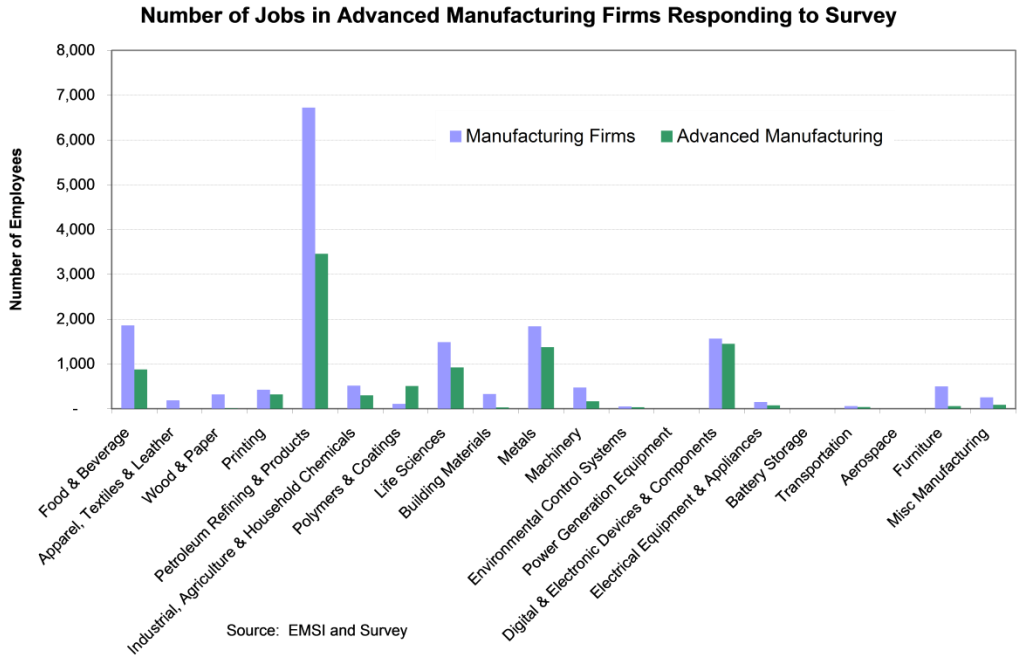
Thirty-five of the advanced manufacturing firms responding to the survey were major firms. Seventeen firms had over 100 employees and another 18 firms had between 50-99 employees. Most of the large manufacturing firms are in the food & beverage processing, petroleum refining, life sciences, polymers & coatings, metal processing and fabrication, machinery, digital and electronic devices, and industrial, agriculture, and household chemicals.



The ninety-two firms that responded to the survey account for 56.6% of the county's total manufacturing employment. Based on the survey with the advanced manufacturing firms, the five subsectors with the most local employees include:

- Petroleum Refining & Products (3,460 local employees)
- Digital and Electronic Devices & Components (1,448)
- Metal Processing & Fabrication (1,373)
- Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment (921)
- Food & Beverage Processing (875)

Note that "local employees" includes all forms of current employment including full-time, part-time, on-call, temporary, seasonal, and independent contractors. Overall, the survey suggests that about 91% of the workers in the manufacturing sector are in "full-time regular" positions.



Geographic Distribution of Advanced Manufacturing Firms in Contra Costa County

Advanced manufacturing firms are distributed throughout Contra Costa County with the least activity in the southern part of county. The Petroleum Refining & Products subsector is concentrated exclusively in the West and Central regions and the Digital and Electronic Devices & Components subsector is found in all regions except East Contra Costa.

About 10% of the survey respondents reported having more than one location in Contra Costa County. For example, a printer may have operations in two or more cities; or a manufacturer may have one location for their production and another for their sales, distribution, or R&D activities. Only the primary production location was counted.

Distribution of Advanced Manufacturing Firms

Region	Businesses	% of Total Firms	Employment	% of Total Employment
West	35	38.1%	4,373	45.1%
Central	30	32.6%	3,118	32.2%
East	21	22.8%	2,016	20.8%
South	6	6.5%	185	1.9%
Total	**92**	**100%**	**9,692**	**100%**

Source: Survey of Advanced Manufacturing Firms in Contra Costa County

Industry Outlook

Manufacturers Optimistic About Economy and Business Growth

Nationally, manufacturers are generally optimistic about the economy and their prospects for business growth. In a recent survey of U.S. Manufacturers, PriceWatersCoopers[9] found that 48% of the respondents expressed optimism about the U.S. economy. Moreover, 83% expect their revenues to go up in the next year and have boosted their expected growth rates from 4.6% to 5.2% in the third quarter.

Overall sentiment among U.S. manufacturers regarding the prospects for the domestic economy rose in the fourth quarter along with company growth projections. 58% of respondents said they would be hiring, up 21 points from the same period in 2011. Those who are hiring said they are looking for professionals/technicians (58%), skilled laborers (35%) and production workers (43%).

The Manufacturers Alliance for Productivity and Innovation (MAPI)[10] predicts that manufacturing will grow faster than the general economy over the next two years. MAPI forecasts that manufacturing production will increase 2.2 percent in 2013 and 3.6 percent in 2014. High-tech production is forecast to increase 4.3 percent in 2013 and 9.0 percent in 2014. Non-high-tech or traditional manufacturing, which accounts for 90 percent of value-added in manufacturing, will grow 1.8 percent in 2013 and 3.8 percent in 2014.

According to Area Development Magazine, advanced manufacturing will drive the U.S. economy, but will require qualified workers with higher skills competencies to do so.[11] Approximately, five percent (5%) of the jobs that manufacturers have open are unfilled because they can't find qualified candidates. With the increased use of technology and advanced manufacturing processes, a skills gap is developing as the demand for low-skill jobs decline and middle and high-skill occupations increase. Regions that have the ability to attract talent or that have the workforce training infrastructure to develop a high skilled workforce will be more competitive.

Criterion Catalysts & Technologies

Bay Point, Contra Costa County

Criterion is a Shell-owned company and the largest manufacturer of hydroprocessing refining catalysts with a 30% global market share.
www.criterioncatalysts.com

[9] Minter, Steve, Industry Week, "US Manufacturers' Optimism Increases in Q4: PwC Survey, Executives focus on domestic market as global uncertainty persists", Jan. 29, 2013
[10] Daniel J. Meckstroth, Manufacturers Alliance for Productivity and Innovation, "U.S. Industrial Outlook Austerity Slows Industrial Activity in 2013, a Pickup Likely in 2014", Economic Outlook, March 2013
[11] Area Development Online, "Advanced Manufacturing Will Drive U.S. Economic Engine", Summer 2012, found online at: http://www.areadevelopment.com/EconomicsGovernmentPolicy/Summer2012/Advanced-Manufacturing-drives-USA-economic-engine-255422.shtml

Growth of Local Manufacturing Sector

Overall the number of jobs within Contra Costa's manufacturing sector is projected to decline over the next five years. Between 2012 and 2018 the manufacturing sector is projected to loose approximately 194 jobs primarily in engineering, administrative, management, and business occupations (see Table below). Despite the decline in the total number of jobs, several key manufacturing occupational categories in production, installation, and transportation are expected to show a net increase in the number of jobs. There also will be a need to fill replacement jobs with skilled workers due to turnover and retirements. Most occupational categories are expected to have openings and will need to find skilled workers to fill replacement jobs.

Employment & Projected Job Openings by Occupational Category in the Manufacturing Sector (2013-2018)

Occupational Category	2013 Employment	Net New Jobs	Replacement Jobs	Total Openings
Management	1,346	-67	238	171
Business and Financial Operations	1,100	-43	248	205
Computer and Mathematical	601	-42	119	77
Architecture and Engineering	1,490	-108	325	217
Life, Physical, and Social Science	805	-19	180	161
Community and Social Service	0	0	0	0
Legal	42	-2	6	4
Education, Training, and Library	<10	0	0	0
Arts, Design, Entertainment, Sports, and Media	94	-4	23	19
Healthcare Practitioners and Technical	68	-2	13	11
Healthcare Support	<10	0	0	0
Protective Service	25	2	3	5
Food Preparation and Serving Related	57	6	10	16
Building and Grounds Cleaning and Maintenance	56	2	8	10
Personal Care and Service	<10	0	0	0
Sales and Related	516	9	115	124
Office and Administrative Support	1,644	-55	307	252
Farming, Fishing, and Forestry	16	6	-4	2
Construction and Extraction	351	-1	57	56
Installation, Maintenance, and Repair	851	48	114	162
Production	6,813	28	956	984
Transportation and Material Moving	1,291	48	182	230
Total	**~17,000**	**-194**	**2,900**	**2,706**

Source: EMSI 2013.1

Rudy's Commercial Refrigeration

Richmond, Contra Costa County

Rudy's Refrigeration has been providing commercial refrigeration products to a wide range of clientele since 1947. Most of their current work is in manufacturing prefabricated NSF approved walk-in coolers & freezers. www.rudysrefrigeration.com

Projected Job Openings in Advanced Manufacturing

In response to survey questions, most advanced manufacturing companies expressed plans to grow their business. When advanced manufacturing firms were asked about how many employees they expected to have working in six to 12 months, staffing levels were

up about 2.5%. Compared to manufacturing firms in general which are not growing, advanced manufacturing firms are growing and hiring new employees.

Projected Job Openings in Advanced Manufacturing

Overall Staffing Level (all sub-sectors)	Total Jobs	Net New Jobs	% Change
Current Jobs	9,692		
In 6 months	9,908	216	2.20%
In 1 year	9,945	253	2.60%
In 3 years	10,553	861	8.90%

Source: Survey of Advanced Manufacturing Firms in Contra Costa County

Projected Job Openings by Subsector

Advanced manufacturing firms in most manufacturing subsectors anticipated new job growth over the next three years. Seven out of 11 subsectors plan on employment growth that will be above the average for all industries in the overall economy. The three fastest growing subsectors over the next 3-years include Electrical Equipment & Appliances (71.2%), followed by Digital and Electronic Devices & Components (33.4%) and Polymers & Coatings (18.8%). The three subsectors that anticipate the largest number of new jobs over the next three years include Digital and Electronic Devices & Components (484 jobs), Metal Processing & Fabrication (131 jobs), and Polymers & Coatings (95 jobs).

Replacement job openings (created by people leaving the occupation or workforce) often exceed the number of job openings due to growth. These figures are often not included due to the fact that employers are not able to accurately predict replacement job openings as a result of people quitting or retiring.

Subsectors with fewer than three employers reporting are not included due to confidentiality requirements.

Projected Job Openings in Advanced Manufacturing by Subsector

Sub-Sector Employment and 3-Year Growth Plans	2013 Employment	2016 Employment	Net New Jobs	% Change	Replacement Jobs
Petroleum Refining & Products	3,460	3,497	37	1.10%	251
Digital and Electronic Devices & Components	1,448	1,932	484	33.40%	87 – 129
Metal Processing & Fabrication	1,373	1,504	131	9.50%	221
Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment	921	909	-12	-1.30%	43
Food & Beverage Processing	875	845	-30	-3.40%	45
Polymers & Coatings	505	600	95	18.80%	77
Printing	318	365	47	14.80%	23
Industrial, Agriculture, & Household Chemicals	298	281	-17	-5.70%	45
Machinery	166	180	14	8.40%	8
Electrical Equipment & Appliances	73	125	52	71.20%	7
Furniture	59	64	5	8.50%	3
Transportation					10
Building Materials					5
Wood & Paper Products					2
Total	**9,496**	**10,303**	**804**	**8.50%**	**832 – 874**

Source: EMSI 2013.1

When advanced manufacturing employers were asked "what jobs will make up the most new positions over the next 3 years, and how many new jobs do you expect to add," these four subsectors were identified as the areas where most new advanced manufacturing jobs will be created:

- Digital and Electronic Devices & Components
- Metal Processing & Fabrication
- Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment
- Food & Beverage Processing

When asked "What are your plans to run and grow your business in the next 2-5 years and what is your most significant barrier to achieving your goals," local employers identified a number of common barriers including an anemic economy recovery; a burdensome regulatory environment; stiff foreign competition; high costs for labor, healthcare, utilities, and new equipment; and difficulty in finding a skilled and motivated workforce.

Common Barriers to Growth
National and Regional Economy
Regulatory Environment
Skilled Workforce & Motivated Workforce
Labor Costs
Foreign Competition
Healthcare Costs/Requirements
Cost of New Equipment
Utility Costs

Major Subsector Trends: Petroleum Refining

The petroleum refining industry includes establishments primarily engaged in refining crude oil into a wide variety of petroleum-based products, including gasoline, diesel, jet fuel, heating oil, and petrochemicals which are used as feedstock by other industries to make plastics, detergents, synthetic rubber, fertilizers, and other products.

The refining of crude oil is highly automated. Most workers use computerized equipment and special instruments to measure and regulate the refining process. Refinery operators and assistants are responsible for the processing of the petroleum, while pump operators and their helpers operate and maintain pumps that move the raw materials and finished products through the refinery. Maintenance workers are needed to repair, replace, and clean the pipes, tanks, towers, and machines that make up a refinery.

While petroleum refineries can be found in 32 states the industry is heavily concentrated in a few states due to resource location factors and access to imported supplies (i.e. close to ports where oceangoing crude oil tankers can dock). California has the third largest petroleum refining industry in the nation, after Texas and Louisiana, based on the number of refineries and capacity. The California petroleum industry represents approximately 12% of the nation's total crude oil distillation capacity with eight companies operating 16 refineries located in the San Francisco Bay Area, Los Angeles, and Kern County.

Petroleum Refining is the largest manufacturing subsector in Contra Costa County employing more than 6,721 workers. Major refineries include Chevron (Richmond), Shell (Martinez), Tesoro Golden Eagle (Avon), and ConocoPhillips (Rodeo). Other firms in this sector include Bay BioDiesel, Golden Gate Petroleum one of the largest distributors of biodiesel in the western United States, Criterion Catalysts & Technologies, BP Lubricants (Castrol Richmond Plant), and General Petroleum Corporation in Richmond.

Tesoro Golden Eagle Refinery

Martinez, Contra Costa County

Tesoro's Golden Eagle refinery is located in Martinez, Calif. on 2,206 acres and has a crude oil capacity of 166,000 barrels per day. The Golden Eagle refinery is the company's largest facility and the second-largest refinery in Northern California.
www.tsocorp.com

Petroleum Refining Subsector Profile

NAICS Code	Descrip-tion	2012 Establish-ments	2013 Jobs	2018 Jobs	Expected Change	Competi-tive Effect	Change	National Location Quotient	2012 Avg. Annual Wage
324110	Petroleum Refineries	17	6,515	6,268	-15	-231	-247	37.04	$177,288
324121	Asphalt Paving Mixture and Block Mfg	4	45	21	-1	-23	-24	1.45	$82,098
324191	Petroleum Lubricating Oil and Grease Mfg	2	54	17	-1	-36	-37	2.18	$81,309
324199	All Other Petroleum and Coal Products Mfg	2	107	112	2	3	5	7.45	$67,879
	Total	24	6,721	6,419	-14	-288	-302	24.76	$173,895

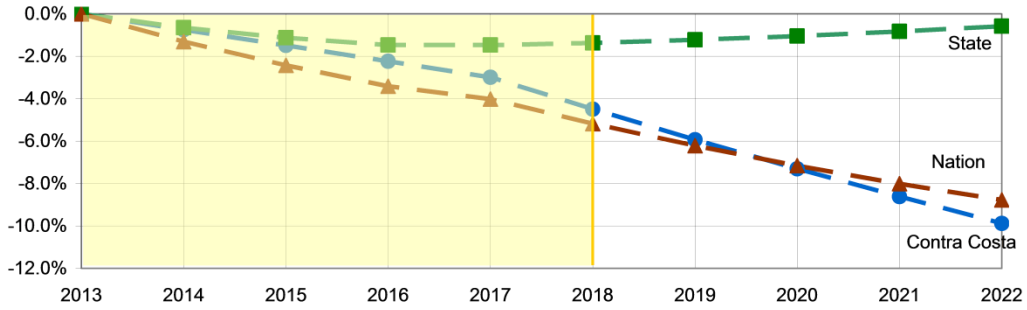
Source: EMSI Covered Employment - 2013.1

Projected Job Growth:

Petroleum refining is a mature subsector and is not expected to generate a significant number of new jobs. Nationally employment in the Petroleum Refining subsector is projected to decline as refineries become more automated and efficient. Emerging industries within this subsector include biofuel refineries which could lead to new job creation depending on Federal and State policies. Over the long term, the Renewable Fuel Standard is expected to play a key role in the development of the U.S. biofuels industry.

Employment projections by the California Employment Development Department for 2010-2020 show a decline in the number of refinery jobs. According to EMSI projections local employment growth in the petroleum refining subsector is expected to show a loss of jobs mirroring the national trend with statewide employment in this subsector remaining relatively stable over the next ten years. Although projected job growth in Contra Costa County is negative there will be a number of openings for replacement jobs due to turnover and retirements. Survey respondents in this subsector anticipate a minor net increase of 37 new jobs and potentially 251 replacement job openings.

Projected Employment in Petroleum Refining Subsector



Major Subsector Trends: Computer and Electronic Products

Companies in this subsector are directly involved in the manufacture, fabrication, and assembly of electronic parts, components, and/or finished products for electronic and communication devices, equipment, or peripherals, including computer and network hardware, satellite systems and other communications mediums, or for the storage and transmission digital media (e.g. video game consoles, video conferencing, mobile communication, digital signage.

According to the Bureau of Labor Statistics national employment in the computer and electronic product manufacturing subsector is expected to decline over the next five years. Although more and more consumers worldwide are using electronics employment levels are expected to decline as a result of productivity growth and the continued off-shoring to low-cost production areas. U.S. employment will be adversely affected by continued increases in imports of electronic and computer products, including intermediate products such as microchips. Although a great deal of the design work in this industry takes place in the United States, much of the manufacturing process has been moved overseas. While employment is expected to decline overall, there will still be employment opportunities - especially in highly skilled positions.

Black Diamond Video

Point Richmond, Contra Costa County

Black Diamond Video is a leading manufacturer and integrator of high-resolution, digital video processing solutions for mission-critical medical and commercial applications.

www.blackdiamondvideo.com

Electronic Devices Subsector Profile

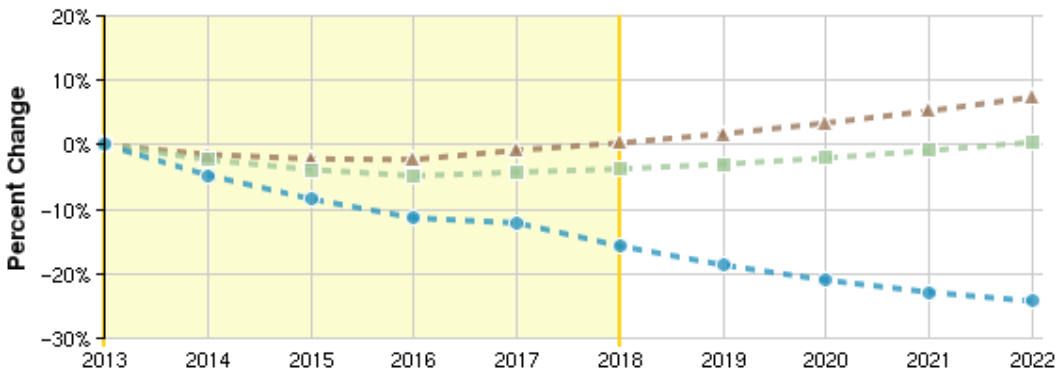
NAICS Code	Descrip-tion	2012 Establish-ments	2013 Jobs	2018 Jobs	Expected Change	Competi-tive Effect	Change	National Location Quotient	2012 Avg. Annual Wage
3341	Computer and Peripheral Equipment	4	16	11	-1	-4	-5	0.04	$60,762
3342	Communic ations Equipment	6	373	364	-34	26	-9	1.51	$70,384
3343	Audio & Video Equipment	3	35	57	-2	24	22	0.8	$88,152
3344	Semicondu ctor & Other Electronic Compone nts	9	192	242	-2	52	50	0.22	$82,073
3345	Navigation al, Measuring, Electrome dical, and Control Instruments	25	948	667	-5	-276	-281	1	$89,250
3346	Magnetic and Optical Media	1	<10	0	0	0	--	--	--
	Total	47	1,564	1,341	-44	-179	-223		$83,856

Source: EMSI Covered Employment - 2013.1

Projected Growth:

Consistent with national trends, Contra Costa County employment in this subsector is expected to decline over the next several years. Beginning around 2018 employment levels in California and across the country are projected to show improvement while Contra Costa County is expected to continue losing jobs. However, employment opportunities for this subsector exist within the East Bay. The California Employment Development Department projects an increase in the number of net new jobs in the East Bay for the computer and electronic products manufacturing subsector. While many of these jobs may be located in southern Alameda County adjacent to Silicon Valley, several industries in this subsector (including audio-video equipment and printed circuit assemblies) are expected to show new job growth in Contra Costa County. *Advanced manufacturing companies that responded to the survey also expect net job growth over the next five years of 484 new jobs and job openings of 87-129 replacement jobs.*

Electronic Devices Subsector Growth



Major Subsector Trends: Metalworking

Metalworking is the process of working with metals to create individual parts, assemblies, or large scale structures from ships and bridges to precise engine parts and delicate jewelry. The primary metals industry includes steel works, blast furnaces, foundry operations; and smelters. The primary metals industries also include facilities that produce metal products from scrap metal. Metal Processing and Fabrication industries transform metal into intermediate or end products using various processes such as forging, stamping, bending, forming, and machining to shape individual pieces of metal and other processes such as welding and assembling to join separate parts together.

Fabricated Metal includes ornamental and structural metals, machine shops, metal valves and fittings, forging and stamping, precision tuned metal manufacturing, and metal containers. Most fabricated metal firms sell to other companies rather than directly to consumers. Technical expertise, manufacturing efficiency, capital intensity, and pricing are the prominent variables affecting competitiveness of metal fabrication enterprises. The specialized nature of many products enables small companies to compete effectively in certain niches.

Fabricated metals firms are most likely to locate near other manufacturers, particularly those up or down stream in their supply chain. Once proximity has been defined other prime location determinants include availability of requisite skills (e.g., CNC machine operator), labor costs, available building, highway linkage, transportation resources, electric power cost/reliability, union risk, moderate taxes and meaningful incentives, and west (California) location due to aerospace industry, proximity to Pacific Rim markets, and technological innovation. Key location factors include proximity to customers and/or suppliers, delivery times, inventory costs and transportation costs.

Fabricated metals is expected to be a growth industry for the U.S. While the industry will become more global, production will remain parochial due to supply chain dictates. U.S. companies will continue expanding by serving a growing domestic market and exporting. Employment can be found at both large industrial plants and small specialized shops.

Quick Mount PV

Walnut Creek, Contra Costa County

Quick Mount PV was founded in 2006 to develop and manufacture innovative waterproof mounting systems designed to attach solar arrays to a variety of roof types.

www.quickmountpv.com

Skilled crafts and semi-skilled production account for the bulk of employment within the industry. A shortage of semiskilled (e.g., CNC machine operator) and skilled (e.g., machinist) labor could constrict growth.

Metal Processing & Fabrication Subsector Profile

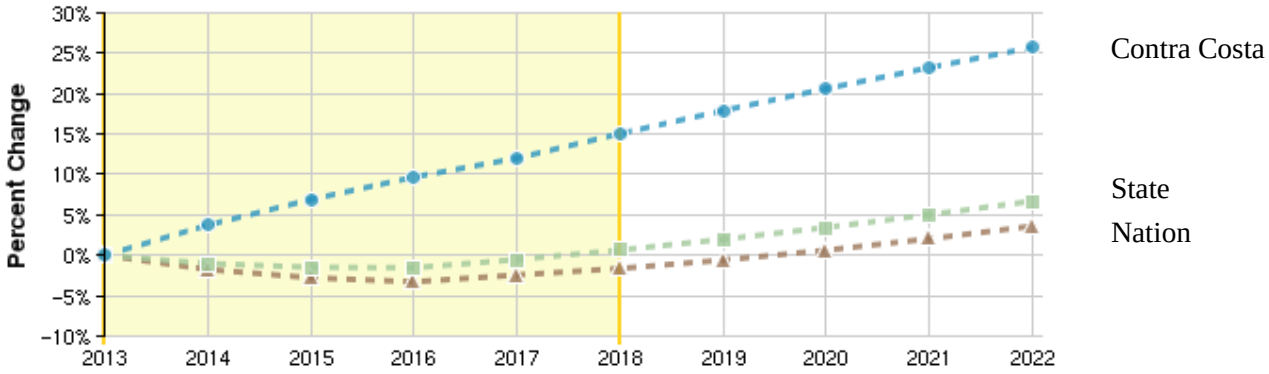
NAICS Code	Descrip-tion	2012 Establish-ments	2013 Jobs	2018 Jobs	Expected Change	Competi-tive Effect	Change	National Location Quotient	2012 Avg. Annual Wage
3311	Iron and Steel Mills and Ferroalloy Manufacturing	2	756	998	-42	284	242	3.5	$76,231
3312	Steel Product Manufacturing from Purchased Steel	1	165	224	2	57	59	1.14	$70,838
3313	Alumina and Aluminum Production and Processing	0	0	0	0	0	0	0	$0
3314	Nonferrous Metal Production and Processing	0	0	0	0	0	0	0	$0
3315	Foundries	6	59	34	1	-25	-25	0.21	$45,825
3321	Forging and Stamping	2	23	24	-1	2	1	0.1	$72,570
3322	Cutlery and Hand tools	1	<10	<10	0	0	--	--	--
3323	Architectural and Structural Metals	22	244	236	16	-24	-8	0.3	$55,676
3324	Boiler, Tank, and Shipping Containers	4	149	113	0	-36	-36	0.67	$74,895
3325	Hardware	0	0	0	0	0	0	0	$0
3326	Spring and Wire Products	1	<10	<10	0	0	--	--	--
3327	Machine Shops; Turned Product; Screw, Nut, & Bolt	21	161	172	3	8	11	0.19	$52,127
3328	Coating, Engraving, Heat Treating, & Allied Activities	8	99	96	3	-6	-3	0.31	$38,766
3329	Other Fabricated Metal Products	10	176	212	2	35	36	0.28	$57,608
	Total	78	1,841	2,119	-17	295	278		$65,232

Source: EMSI Covered Employment - 2013.1

Projected Growth:

Net new job growth in Contra Costa County is expected across most industries within the metal processing and fabrication subsector over the next five years. Advanced manufacturing firms anticipate an increase of 9.5% in net new jobs along with 221 openings for replacement jobs.

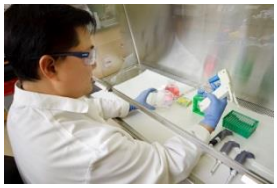
Metal Processing and Fabrication Subsector Growth



Major Subsector Trends: Life Sciences

The life-sciences subsector includes pharmaceutical, medical equipment and supplies, biotechnology and medical technology companies. In 2007, this subsector accounted for half of life science manufacturing employment and 38 percent of all life science jobs. Furthermore, companies within this subsector pay above the national industry average. Life sciences companies in Contra Costa County include Bio-Rad, MicroFluidix, Sangamo Biosciences, Transcept Pharmaceuticals, Bay Bioanalytical Laboratory, BioGenex, Cerus, Epito Genesis, Eureka Genomics, Odyssey Thera, SCiAN Services, Berlex Biosciences, Muir Labs, and a number of dental and medical laboratories.

Careers in the life sciences subsector span a wide variety of industries – such as biotechnology, drugs, pharmaceutials, medical and veterinary products, research and development, food processing, agriculture, chemical products, and environmental firms. The jobs performed by workers with a bioscience or biotechnology background can range from lab work to field monitoring, research & development to manufacturing, regulatory affairs and quality assurance, and business areas such as sales and technical service.



Bio-Rad Laboratories

Hercules, Contra Costa County

Bio-Rad Laboratories, Inc. has played a leading role in the advancement of scientific discovery for 60 years by providing a broad range of innovative products to the life science research and clinical diagnostics markets.

www.bio-rad.com

Life Science Subsector Profile

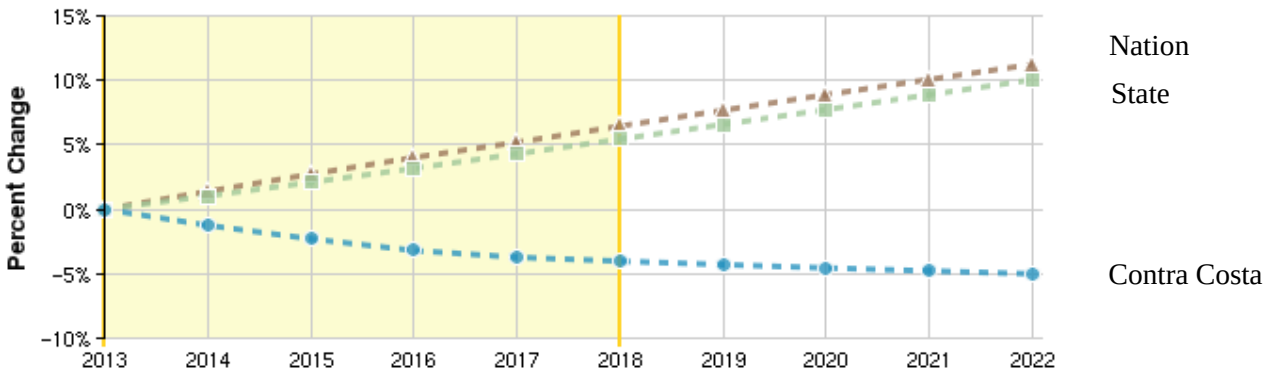
NAICS Code	Descrip-tion	2012 Establish-ments	2013 Jobs	2018 Jobs	Expected Change	Competi-tive Effect	Change	National Location Quotient	2012 Avg. Annual Wage
325411	Medicinal and Botanical Manufacturing	1	27	29	-1	3	2	0.59	$99,960
325412	Pharmaceutical Preparation Manufacturing	7	203	93	8	-119	-110	0.4	$70,663
325413	In-Vitro Diagnostic Substance Manufacturing	3	298	399	56	45	101	6.16	$102,069
325414	Biological Product (except Diagnostic) Manufacturing	0	0	0	0	0	0	0	$0
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	2	161	158	18	-20	-3	1.11	$102,043
339112	Surgical and Medical Instrument Manufacturing	3	461	512	35	16	51	1.54	$62,135
339113	Surgical Appliance and Supplies Manufacturing	3	62	57	2	-7	-5	0.25	$61,482
339114	Dental Equipment and Supplies Manufacturing	4	90	83	4	-11	-7	2.24	$52,035
339115	Ophthalmic Goods Manufacturing	2	40	28	-1	-12	-12	0.59	$39,254
339116	Dental Laboratories	33	145	69	3	-79	-76	1.39	$36,256
	Total	58	1,488	1,428	124	-184	-60		$71,364

Source: EMSI Covered Employment - 2013.1

Projected Growth:

The Life Sciences subsector in Contra Costa County is projected to loose jobs over the next five years especially in drug manufacturing. This loss will be offset by new job opportunities with diagnostic firms. Most survey respondents also expected a decline in employment. Replacement jobs and turnover will be the primary employment opportunities within this subsector over the short term.

Life Sciences Subsector Growth



Major Subsector Trends: Food and Beverage Processing

The food and beverage subsector processes fruits and vegetables, meats, dairy products, seafood, and other agriculture products in a way that adds value to consumers. The primary activities of firms in the food manufacturing subsector include processing, canning, freezing, baking, milling, packaging and distributing. Some food manufacturing firms are involved with harvesting and/or marketing of the final product, but most partner with other organizations that specialize in these activities.

In 1999, there were 51 companies in food processing and 13 in beverage manufacturing. Between 1999 and 2008 the number of food processing firms declined by 13.7%, while the number of beverage manufacturers increased by 15.4%. Total employment in food processing declined 42.6% during the same time period from 2,555 to 1,466 workers, in part due to plant closings and the recent recession.

In 2012, the Food and Beverage Processing subsector accounted for almost 11% of the Contra Costa County's total manufacturing employment with 2,211 jobs. The top three Food Processing industry groups by employment are Bakeries (513) Sugar and Confectionary Product Manufacturing (415), and Beverage Manufacturing (328).

C&H Sugar

Crockett, Contra Costa County

Part of Domino Foods, Inc., C&H Sugar has a rich history that spans over 100 years and offers consumers a variety of fine quality, all-natural pure cane sugar products as well as alternative sweetening products.

www.chsugar.com

Food & Beverage Subsector Profile

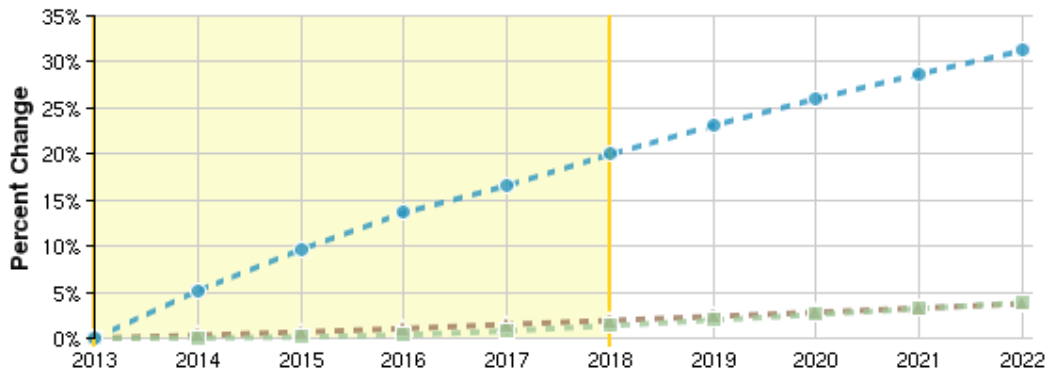
NAICS Code	Descrip-tion	2012 Establish-ments	2013 Jobs	2018 Jobs	Expected Change	Competi-tive Effect	Change	National Location Quotient	2012 Avg. Annual Wage
3111	Animal Food Manufacturing	1	<10	<10	0	--			--
3112	Grain and Oilseed Milling	2	72	91	19	19			$72,082
3113	Sugar and Confectionery Product Manufacturing	6	415	468	65	53			$74,209
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	5	192	220	31	28			$51,889
3115	Dairy Product Manufacturing	3	206	281	74	75			$44,652
3116	Animal Slaughtering and Processing	0	0	0	0	0			$0
3117	Seafood Product Preparation and Packaging	0	0	0	0	0			$0
3118	Bakeries and Tortilla Manufacturing	20	513	494	-22	-19			$36,951
3119	Other Food Manufacturing	6	133	209	70	76			$34,679
3121	Beverage Manufacturing	17	328	468	134	140			$50,090
3122	Tobacco Manufacturing	0	0	0	0	0			$0
	Total	60	1,859	2,230	371	371	0.44	2.79	$51,222

Source: EMSI Covered Employment - 2013.1

Projected Growth:

The Food and Beverage Processing subsector in Contra Costa County shows strong job growth over the next five years. The food processing industry is expected to grow by 371 new job openings by 2018 with sugar, dairy products, and beverage manufacturing accounting for 72.2% of all new jobs in this subsector. Several advanced manufacturing firms responding to the survey indicated that they expect to install new equipment and other improvements that will lead to productivity gains resulting in a potential loss of jobs. A number of job openings also will be available due to replacement jobs.

Food & Beverage Processing Subsector

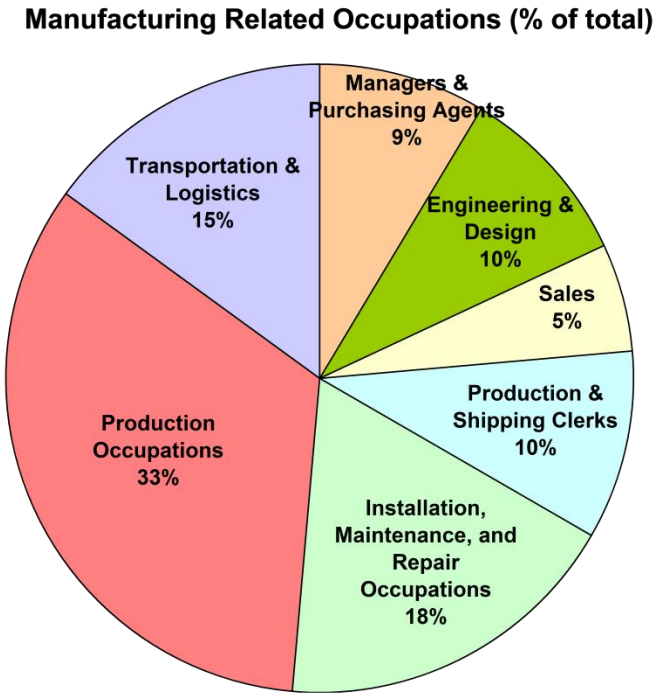


Industry Staffing Patterns

Occupational Categories

Industry staffing patterns reflect the distribution of occupations that are most common to a specific industry. Occupations typically found in the manufacturing sector are identified in the table below. Production occupations constitute the largest percentage of jobs in most manufacturing firms. Other key occupational categories include installation, repair & maintenance; transportation & logistics; quality assurance; and engineering/process development. Research and development and product design are also important. These occupations typically represent 85% or more of all manufacturing jobs. Sales and marketing, business support, management, and administrative occupations which are common across all industries are also part of a manufacturing firm's operation.

Industry staffing patterns allow users to examine the occupational composition of an industry. Staffing patterns list the occupations typically employed within a particular industry, or identify the leading industries that employ a particular occupation. Both job seekers and training providers may use these lists to contact employers regarding job openings.



Typical Manufacturing Occupations

Occupational Group	Representative Occupations
Engineering/Process Development	Industrial Engineers Software Applications Engineers Mechanical Engineering Technicians
Production	Machinists Production Worker Supervisors Team Assemblers
Installation, Repair & Maintenance	Maintenance and Repair Workers, General Industrial Machinery Mechanics Maintenance Workers, Machinery
Logistics	Logisticians Heavy Truck Drivers Shipping, Receiving, and Traffic Clerks
Quality Assurance	Environmental Engineering Technicians Occupational Health and Safety Specialists Inspectors, Testers, Sorters, Samplers, and Weighers

Industry Staffing Patterns of Leading Subsectors

SOC Code	Occupational Category	% of Total Jobs in Industry Segment By Occupational Category				
		Petroleum Refining	Electronic Devices	Metal Fabrication	Life Sciences	Food & Beverage
11-0000	Management	8.1%	11.4%	6.6%	9.8%	4.6%
13-0000	Business & Finance Operations	9.4%	7.8%	3.3%	6.9%	2.2%
15-0000	Computer & Math Occupations	4.1%	11.3%	1.1%	4.0%	0.4%
17-0000	Architecture & Engineering	9.6%	27.6%	4.7%	9.5%	0.7%
19-0000	Scientific	8.4%	0.5%	0.3%	8.5%	1.6%
23-0000	Legal	0.5%	0.1%	-	0.2%	-
27-0000	Arts, Design	0.1%	0.7%	0.1%	0.6%	0.5%
29-0000	Healthcare Practitioners	0.6%	0.1%	0.3%	0.8%	0.1%
31-0000	Healthcare Support	-	-	-	0.1%	-
33-0000	Protective Services	0.2%	0.2%	0.2%	0.1%	0.1%
35-0000	Food Preparation	-	-	-	-	3.1%
37-0000	Building/Grounds Maintenance	0.1%	0.2%	0.3%	0.4%	1.2%
41-0000	Sales	1.6%	3.8%	1.9%	2.8%	7.7%
43-0000	Office/Administrative	7.3%	9.7%	9.8%	12.8%	9.0%
45-0000	Farming	-	-	-	-	0.8%
47-0000	Construction	3.4%	0.1%	2.7%	0.1%	0.3%
49-0000	Installation, Maintenance	5.6%	1.9%	8.9%	2.6%	5.5%
51-0000	Production	34.5%	23.2%	52.3%	37.2%	43.8%
53-0000	Transportation	6.6%	1.3%	7.5%	3.5%	18.5%

Source: EMSI data 2013.1

Occupational Outlook

Workforce needs assessment survey respondents indicated that they anticipate job openings in a wide variety of occupations over the next three years as a result of new positions and replacement jobs.

Subsector	Jobs Expected To Make Up The Most "New" Positions Over The Next 3 Years	Most Job Openings Expected Over The Next 3 Years As A Result Of Replacements
Food & Beverage Processing	• baker assistant (14 new jobs), baker (6) • manufacturing workers (4), maintenance (2) • production (20), sanitation (10), maintenance (2) • production worker (20)	• baker assistant (5) • maintenance (3), warehouse worker (3) • millwright (25) • production (3), sanitation (2), maintenance (1) • production worker (3)
Wood & Paper Products	• manufacturing worker (2)	•
Printing	• binders (2) • bindery (1), prepress (1), business office (1) • bindery and mailing (9), prepress (1) • marketing (1), information technology (1) • preflight (1) (refers to digital prepress specialists), digital press (1) • pressman (1), delivery driver (1), shop helper (1), bindery (1) • production (5) • sales, production, discovery (unsure how many)	• prepress (1) • press assistant (4), press shift lead (1), press operator (1) • pressman (5), feeder (5) • production (3), designer (1) • production worker (2)
Petroleum Refining & Products	• engineer (8), inspector (4), process controls (3) • laborer (5) • operations (5), maintenance (3), technical (2)	• laborer (1) • operations (21), technical (9) • operations (60), maintenance crafts (30), entry level engineer (17) • operator (20), skilled craft (20) • operator (45), maintenance craft (18), engineer (10)
Industrial, Agriculture & Household Chemicals	• drivers (3), operation technician (1)	• driver (6), operation technician (3), mechanic (1) • line worker (15) • mechanic (5), chemical engineer (2), mechanical engineer (2), operator (2) • operator (3) • plant operator (3) • process engineer (3)
Polymers & Coatings	• chemical engineer (?), planner (?), instrumentation electrical (I & E) technician (?) • quality engineer (4), process engineer (3), application engineer (1) • technician (7), production (7)	• production operator (5), quality control (QC) laboratory technician (2) • production technician (50) • technician (10), production (10)

Subsector	Jobs Expected To Make Up The Most "New" Positions Over The Next 3 Years	Most Job Openings Expected Over The Next 3 Years As A Result Of Replacements
Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment	• ceramist (1), waxer (1) • compounders (2), assistant compounders (2) • dental laboratory technician (1) • dental laboratory technician (3) • laboratory technician (up to 20) • manufacturing technician (20), quality control (12), manufacturing associate (10) • sewers (4), packing (2), cutter (1)	• assembler (20), warehouse worker (20) • ceramist (1), receptionist (1) • dental laboratory technician (1)
Building Materials	• laborer (5)	• equipment operator (3) • laborer (2)
Metal Processing & Fabrication	• mechatronic engineer (2), application engineer (1), supplier diversity channel manager (1), director marketing (1), machinist (1), assembly worker (1), estimator (1), territory sales (1) • CNC machinist operator (10), CNC setup operator (10), CNC programmer (3) • entry level manufacturer (20), operator (10), maintenance mechanic (2), shipping/forklift (2) • fabricator (3) • general labor (3), manufacturing painter - metal and wood (2) • journey level welder (1), production worker (1) • welder (2), laborer (2), labor operator (1) • laser technician (3), quality control (2) • lathe hand machinist (1), machine operator (1), quality control engineer (1) • lead machinist (1), machinist (1), shop labor (1) • machine operator (1), machinist (1) • maintenance/machine operator (14) • polisher (1), plater (1) • production operator (20), machinist (1) • quality (1), planning (1), production control (1), shift supervisor (1) • rod buster (3) • shop production (1)	• application engineer (1), mechatronic engineer (1), R&D engineer (1), design engineer (1) • entry level manufacturer (30), operator (20), maintenance mechanic (3), shipping/forklift (3), shipping supervisor (1) • entry level operator (30), electrical technician (20), millwright (20), machinist (3) • entry level operator (50), maintenence - electrical or mechanical (18) • fabricator (3) • journey level welder (1), production worker (1) • laser technician (1), quality control (1) • machine operator (1) • machinist (1) • machinist (2) • maintenance/machine operator (1) • operator (2), mechanic (1) • production operator (3) • rod buster (1)
Machinery	• mechanical engineer (5) • production technician (3) • optical technician (4), senior project engineer (3), manufacturing process engineer (3), quality assurance supervisor (1), senior generating technician (1), optician (1), engineering manager (1), planner/scheduler (1), quality assurance (QA) inspector (1)	• optical technician (4), senior professional engineer (1), manufacturing professional engineer (1), quality assurance (QA) inspector (1), senior generating technician (1)
Environmental Control Systems	• data entry (1),. shop worker (10), service and repair worker (3), refrigeration systems assembler (2) • assemblers (3), production technician (1)	•

Subsector	Jobs Expected To Make Up The Most "New" Positions Over The Next 3 Years	Most Job Openings Expected Over The Next 3 Years As A Result Of Replacements
Digital and Electronic Devices & Components	• assembler (5) • engineers - electrical and firmware (5-10), scientist (5-10), buyer/planner (5-10), assembler/technician (5-10), material handler (5-10) • engineers (8) • machinist (50), detailer/finisher (10), inspectors (10), assembler (10) • manufacturing assistant/CNC operator (3) • manufacturing support (5), design engineer (2), lead manufacturing support (1) • RF engineer (5-7), manufacturing engineer (3), software engineer (3), printed circuit board designer (3), digital engineer (3), mechanical engineer (2), firmware engineer (2), assembly supervisor (1) • testing technician (2), assembly technician (2), operations (2)	• assembly line (1) • direct labor (1), skilled technician (1), skilled hybrid assembler (1), RF designer with experience (1), digital designer with experience (1), assembly supervisor (1), test supervisor (1) • machinist (15), assembler (10), detailer (4), inspector (4) • material handler (15-30), production assembler (15-30), buyer/planner (5-10), mechanical and electrical firmware engineers (5-10), production management, 3-5 • technical support engineer (3)
Electrical Equipment & Appliances	• assembler (12), fabricator (2), warehouse worker (2), design/electrical engineer (1) • information technology (1), machinist (?), assemblers (?) • machinists (3), production workers (2)	• assembler (4), fabricator (2), design/electrical engineer (1)
Transportation	• assembler (1), quality control (1), parts cleaner (1) • engineer (2), carbon fiber technician (2), project developer (1)	• parts cleaner (10)
Furniture	• CAD/CNC wood operator (1), shop helper (1) • seamstress (2)	• fabricator (3)
Other Subsectors	• manufacturer (5), installers (5) • personal assistant (1)	• assembler (2), press operator (1), production manager (1) • installer (1)

Recruitment Methods

Employers typically use a variety of recruitment methods. The majority of employers (55%) report using "referrals" as one of their most common recruitment methods. Referrals can refer to any number of referral options including personal referrals, employee referrals, or referrals from third parties (including union halls and employment agencies).

"Agency" (or "agencies") generally refers to one or more employment or staffing agencies that the employer uses.

Note that some of the recruitment method names reported by employers were changed to provide greater consistency. However, the order of the recruitment methods reported by individual employers were not changed (because, chances are, if the employer reports using four different recruitment methods, the first one reported is likely used more than the fourth one reported).

One means of attracting and retaining key talent is to introduce and expand workplace flexibility, offering workers options in terms of where, when, and how work is to be performed. The aging of the workforce offers employers an opportunity to re-vitalize any prior effects to advance their flexible work options, since older workers (like their younger colleagues) express a preference for access to flexible work options.

Sloan Center on Aging & Workforce

Recruitment Methods Used Most Often to Find Prospective Job Applicants

Subsector	Agencies	Job Websites	Referrals	Newspaper Ads	Walk-ins	EDD	One-Stop Centers	WDB	Veterans Organization	Local Colleges	Recruiters	Corporate Website	Nonprofit Organization	Local Union	Trade Association
Food & Beverage Processing	1	4	2	1	1			1							
Wood & Paper Products		1	1												
Printing		10	7		2	2				1			1	1	3
Petroleum Refining		3	1	1		1				2		2			
Industrial Chemicals	2	3	4			1			1	3	2	1			
Polymers & Coatings	1	2	1	1						1	1	1			
Life Sciences	1	5	8	4	3				1	3		2			
Building Materials			1											1	
Metal Processing	7	16	15	2	6			2		3	1			1	1
Machinery	2	1	2									1			
Environmental Controls		3													
Electronics		13	7							3	1				
Electrical	1	4	1		1										
Transportation		2	1	1					1	1		1			
Furniture			2	1										1	

Supply of Skilled Workers

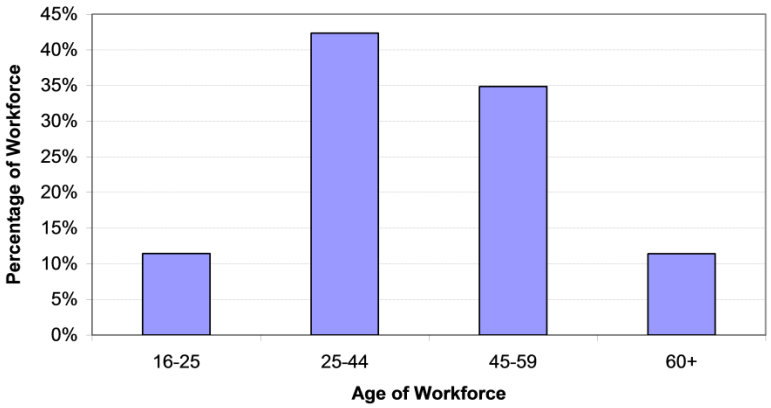
A skilled workforce is a key factor in attracting and retaining growing companies. Maintaining a competitive workforce must account for fluctuations in the size, composition, and skill level of the working population. The median age of Contra Costa County's workforce is 42.3 years, which is older than both the national (40.5 years) and statewide (39.9 years) averages. Approximately 45% of the county's workforce is age 45 or older. Over the next ten years, older workers age 55-64 will be the fastest growing segment of the county's workforce. For production related occupations, approximately 15% of the workers are age 55 and older. Less than 10% are under the age of 25. A wave of retirement in the manufacturing sector could leave manufacturers with skill shortages and high costs for recruiting and training new employees.

Manufacturers face significant workforce challenges, including an aging workforce, difficulty recruiting new workers, and the need to upgrade workers' skills to adapt to increasingly tech-saturated factories.

A wide range of occupations are essential to the manufacturing sector, but it is distinguished by a heavy reliance on four essential occupational categories: production, installation and maintenance, logistics and engineering - as shown on the Supply of Skilled Workers chart. It will be critically important to attract younger workers to these occupations. There is a need to encourage the younger generations to choose advance manufacturing as a career option.

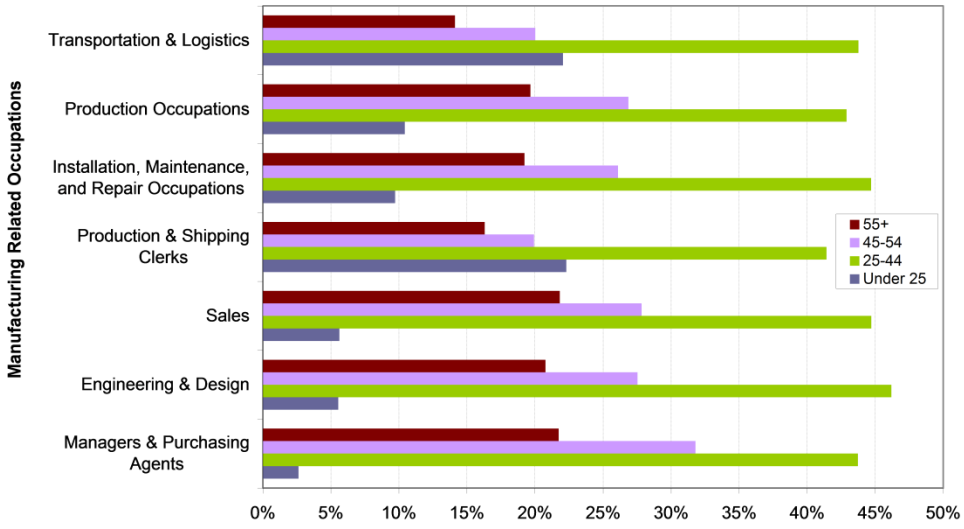
The number of replacement jobs on the other hand is significant as the county's aging workforce creates openings due to older workers retiring. The aging workforce creates both challenges and opportunities for manufacturing firms in recruiting and training younger workers with advanced skills.

Age Distribution of County Workforce

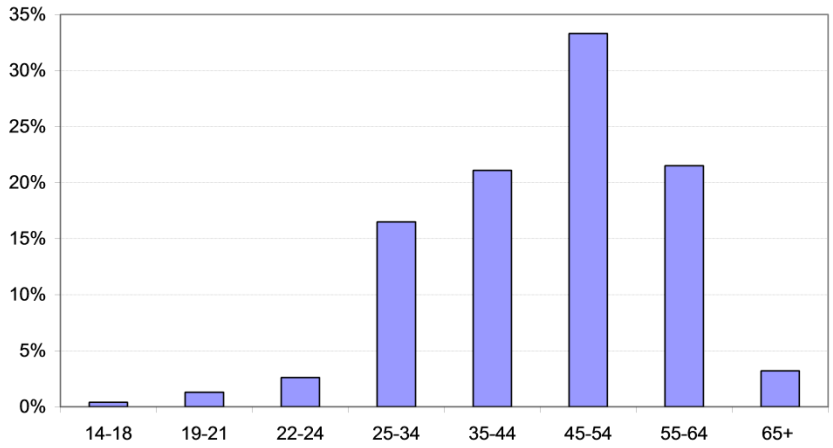


Source: U.S. Census Bureau

Supply of Skilled Workers



Age Profile of Workers in the Manufacturing Sector



In-Demand Occupations

Job Openings

In-demand occupations include occupations with the most job openings due to net new job growth as well as replacement jobs from workers leaving an occupation or retiring. In-demand occupations also include the "fastest growing" occupations with the largest percent change (or fastest rate of growth).

Projections of job growth provide valuable insight into future employment opportunities because each new job created is a net employment opportunity for a worker entering an occupation. However, opportunities also arise when workers leave their occupations and need to be replaced due to retirement and other factors. In most occupations, replacement needs provide more job opportunities than new job growth.

Replacement job openings resulting from workers retiring from or permanently leaving an occupation will create the largest number of job opportunities in the manufacturing sector. Because workers entering an occupation often need training, these replacement needs may be used, along with job growth, to assess the minimum number of workers who will need to be trained for the occupation. This estimate of replacement needs does not count the turnover, or workers who change jobs but remain in the same occupation. Turnover includes a significant degree of musical chairs where a person leaves a job with one company to go to work for another company in the same occupation. A job opening that results from turnover does not create a net employment opportunity for a worker entering an occupation. However, incumbent worker training will be a factor in helping local manufacturers remain competitive.

Despite the overall decline in employment within Contra Costa County's manufacturing sector, there are a number of occupations with job openings due to new job growth or replacement jobs that will provide opportunities for job seekers. While manufacturing jobs have declined over the past several decades, a number of production occupations (SOC 51) have seen a positive increase due to the use of new technologies and process improvements that reduce costs from product redesign, excess materials, and inefficient supply chains. The incorporation of automated equipment and lean manufacturing processes, however, requires a highly skilled workforce - proficient in applied math and science, team building, problem solving, and critical thinking abilities.

Occupational Analysis

Advanced manufacturing demands skilled workers that understand both the processes that drive manufacturing, but also the need to embrace innovation, new technologies, and ideas. The education/training level for 17 of the top 50 manufacturing occupations in Contra Costa County requires only short term training, while long term training or post-secondary education is required for 13 of the top 50 occupations.

Conducting an occupational analysis helps identify the major requirements, technical skills, and personal competencies needed by workers to perform their jobs. The occupational analysis describes an occupation in terms of various characteristics, including the purposes, task characteristics, task duties, necessary skills, and required abilities for that occupation. These occupational characteristics have been included in a report entitled *Job Opportunities in Advanced Manufacturing*.

Demand Occupations for the Overall Manufacturing Sector

	Occupations with the Most Job Openings		Occupations with the Most Replacements
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers
19-4041	Geological and Petroleum Technicians	51-9023	Mixing and Blending Machine Setters, Operators, and Tenders
49-9041	Industrial Machinery Mechanics	11-1021	General and Operations Managers
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	51-2092	Team Assemblers
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	43-5071	Shipping, Receiving, and Traffic Clerks
51-9111	Packaging and Filling Machine Operators and Tenders	43-4051	Customer Service Representatives
51-2092	Team Assemblers	51-1011	First-Line Supervisors of Production and Operating Workers
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	19-2031	Chemists
51-1011	First-Line Supervisors of Production and Operating Workers	19-4041	Geological and Petroleum Technicians
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	13-2051	Financial Analysts
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	11-9041	Architectural and Engineering Managers
53-7051	Industrial Truck and Tractor Operators	13-1199	Business Operations Specialists, All Other
49-9071	Maintenance and Repair Workers, General	17-2141	Mechanical Engineers
43-4051	Customer Service Representatives	17-2011	Aerospace Engineers
11-3051	Industrial Production Managers	53-7062	Laborers and Freight, Stock, and Material Movers, Hand
43-5071	Shipping, Receiving, and Traffic Clerks	17-2112	Industrial Engineers
13-2051	Financial Analysts	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers
11-1021	General and Operations Managers	19-4031	Chemical Technicians
51-9198	Helpers--Production Workers	13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products
51-7011	Cabinetmakers and Bench Carpenters	51-6031	Sewing Machine Operators
51-3092	Food Batchmakers	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products
19-2031	Chemists	11-3051	Industrial Production Managers
53-7064	Packers and Packagers, Hand	53-7051	Industrial Truck and Tractor Operators
43-5061	Production, Planning, and Expediting Clerks	13-2011	Accountants and Auditors
13-1199	Business Operations Specialists, All Other	17-2071	Electrical Engineers
17-2112	Industrial Engineers	53-3032	Heavy and Tractor-Trailer Truck Drivers
43-9061	Office Clerks, General	43-5061	Production, Planning, and Expediting Clerks
17-2141	Mechanical Engineers	15-1121	Computer Systems Analysts
51-4121	Welders, Cutters, Solderers, and Brazers	17-3029	Engineering Technicians, Except Drafters, All Other
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	51-9011	Chemical Equipment Operators and Tenders

Demand Occupations for the Overall Manufacturing Sector			
	Fastest Growing Occupations		**Occupations with the Most New Jobs**
51-4051	Metal-Refining Furnace Operators and Tenders	51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	51-9111	Packaging and Filling Machine Operators and Tenders
51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	49-9041	Industrial Machinery Mechanics
53-3031	Driver/Sales Workers	51-3092	Food Batchmakers
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing
53-7021	Crane and Tower Operators	51-7011	Cabinetmakers and Bench Carpenters
19-1012	Food Scientists and Technologists	53-7062	Laborers and Freight, Stock, and Material Movers, Hand
35-2021	Food Preparation Workers	49-9071	Maintenance and Repair Workers, General
47-2031	Carpenters	51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders
51-4052	Pourers and Casters, Metal	51-4051	Metal-Refining Furnace Operators and Tenders
51-3092	Food Batchmakers	19-4041	Geological and Petroleum Technicians
51-3093	Food Cooking Machine Operators and Tenders	53-3031	Driver/Sales Workers
17-2051	Civil Engineers	51-9198	Helpers--Production Workers
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	53-7064	Packers and Packagers, Hand
41-2031	Retail Salespersons	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products
53-7061	Cleaners of Vehicles and Equipment	53-7051	Industrial Truck and Tractor Operators
49-9041	Industrial Machinery Mechanics	41-2031	Retail Salespersons
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	51-4052	Pourers and Casters, Metal
17-2031	Biomedical Engineers	51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic
51-7011	Cabinetmakers and Bench Carpenters	53-7021	Crane and Tower Operators
51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	51-9399	Production Workers, All Other
51-8021	Stationary Engineers and Boiler Operators	51-3093	Food Cooking Machine Operators and Tenders
51-9111	Packaging and Filling Machine Operators and Tenders	51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic
53-7063	Machine Feeders and Offbearers	47-2031	Carpenters
51-9141	Semiconductor Processors	51-4121	Welders, Cutters, Solderers, and Brazers
33-9032	Security Guards	53-3033	Light Truck or Delivery Services Drivers
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	17-2031	Biomedical Engineers
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	19-1012	Food Scientists and Technologists
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	13-1081	Logisticians
43-4161	Human Resources Assistants, Except Payroll and Timekeeping	53-7061	Cleaners of Vehicles and Equipment

In-Demand Occupations by Major Subsector

Petroleum Refining & Products Subsector: In-Demand Occupations (Grouped by Occupational Category)							
SOC Code	**Occupation**	**Fastest Growing**	**Net New Jobs**	**Replacement Jobs**	**Total Job Openings**	**Median Hourly Earnings**	**Education Level**
	Production Occupations						
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	-7%	-82	278	196	$35.62	Long-term on-the-job training
51-1011	First-Line Supervisors of Production and Operating Workers	-5%	-10	43	51	$33.83	Work experience in a related occupation
51-9023	Mixing/Blending Machine Setters, Operators, &Tenders	-5%	-12	63	38	$20.76	Moderate-term on-the-job training
51-9111	Packaging & Filling Machine Operators & Tenders	-5%	-4	14	13	$12.31	Moderate-term on-the-job training
51-9011	Chemical Equipment Operators and Tenders	-2%	-1	7	12	$31.32	Moderate-term on-the-job training
	Installation Occupations						
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	-8%	-5	15	7	$37.25	Work experience in a related occupation
49-3031	Bus/Truck Mechanics & Diesel Engine Specialists	-8%	-1	3	2	$27.80	Postsecondary non-degree award
49-9041	Industrial Machinery Mechanics	5%	7	17	27	$35.76	Long-term on-the-job training
49-9043	Maintenance Workers, Machinery	-6%	-2	8	6	$29.33	Moderate-term on-the-job training
49-9071	Maintenance and Repair Workers, General	-5%	-5	20	12	$20.37	Moderate-term on-the-job training
	Engineering Occupations						
17-3029	Engineering Technicians, Except Drafters, All Other	-8%	-11	37	12	$38.70	Associate's degree
17-2171	Petroleum Engineers	-4%	-5	17	26	$61.73	Bachelor's degree
17-2199	Engineers, All Other	-11%	-8	16	17	$53.27	Bachelor's degree
17-2112	Industrial Engineers	-5%	-4	13	10	$48.85	Bachelor's degree
17-2041	Chemical Engineers	-7%	-3	12	8	$68.34	Bachelor's degree
	Logistic Occupations						
53-3032	Heavy and Tractor-Trailer Truck Drivers	-4%	-4	15	16	$21.53	Short-term on-the-job training
53-7032	Excavating & Loading Machine & Dragline Operators	0%	0	2	2	$34.09	Moderate-term on-the-job training

53-7051	Industrial Truck and Tractor Operators	-6%	-6	15	11	$20.50	Short-term on-the-job training
53-7062	Laborers & Freight, Stock, & Material Movers	-7%	-7	20	11	$12.42	Short-term on-the-job training
53-7121	Tank Car, Truck, and Ship Loaders	-13%	-9	18	13	$26.86	Short-term on-the-job training
	Quality Assurance Occupations						
17-2081	Environmental Engineers	-8%	-3	9	3	$53.35	Bachelor's degree
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	0%	0	3	3	$47.77	Bachelor's degree

Digital and Electronic Devices & Components Subsector: In-Demand Occupations (Grouped by Occupational Category)							
SOC Code	**Occupation**	**Fastest Growing**	**Net New Jobs**	**Replacement Jobs**	**Total Job Openings**	**Median Hourly Earnings**	**Education Level**
	Production Occupations						
51-2022	Electrical and Electronic Equipment Assemblers	-7%	-8	16	8	$14.18	Short-term on-the-job training
51-2092	Team Assemblers	-22%	-11	16	5	$13.44	Moderate-term on-the-job training
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	-10%	-4	8	4	$19.52	Moderate-term on-the-job training
51-9141	Semiconductor Processors	13%	2	0	2	$15.72	Associate's degree
51-4041	Machinists	-30%	-6	8	2	$23.99	Long-term on-the-job training
	Installation Occupations						
	Engineering Occupations						
17-2011	Aerospace Engineers	-33%	-26	38	12	$46.16	Bachelor's degree
17-2071	Electrical Engineers	-24%	-14	23	9	$49.55	Bachelor's degree
17-2072	Electronics Engineers, Except Computer	-16%	-7	15	8	$43.53	Bachelor's degree
17-3023	Electrical and Electronics Engineering Technicians	-17%	-9	15	6	$27.93	Associate's degree
17-2141	Mechanical Engineers	-27%	-7	12	5	$43.88	Bachelor's degree
	Logistic Occupations						
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	-20.0%	-2	4	2	$12.42	Short-term on-the-job training
53-3032	Heavy and Tractor-Trailer Truck Drivers						Short-term on-the-job training
53-3033	Light Truck or Delivery Services Drivers						Short-term on-the-job training
53-7063	Machine Feeders and Offbearers						Short-term on-the-job training
	Quality Assurance Occupations						
17-2111	Health and Safety Engineers						Bachelor's degree

Life Sciences Subsector: In-Demand Occupations (Grouped by Occupational Category)							
SOC Code	**Occupation**	**Fastest Growing**	**Net New Jobs**	**Replacement Jobs**	**Total Job Openings**	**Median Hourly Earnings**	**Education Level**
	Production Occupations						
51-9081	Dental Laboratory Technicians		-7	20	13	$16.81	Moderate-term on-the-job training
51-2092	Team Assemblers		-6	14	8	$13.44	Moderate-term on-the-job training
51-9061	Inspectors, Testers, Sorters, Samplers		0	7	7	$19.52	Moderate-term on-the-job training
51-9111	Packaging and Filling Machine Operators & Tenders		-2	8	6	$12.31	Moderate-term on-the-job training
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders		0	3	3	$20.76	Moderate-term on-the-job training
	Installation Occupations						
49-9062	Medical Equipment Repairers		0			$28.59	Associate's degree
49-9069	Precision Instrument and Equipment Repairers, All Other		0			$22.38	Long-term on-the-job training
49-9799	Installation, Maintenance, and Repair Workers, All Other		0			$21.12	Moderate-term on-the-job training
49-9071	Maintenance and Repair Workers, General		-1	3	2	$20.37	Moderate-term on-the-job training
	Engineering Occupations						
17-2031	Biomedical Engineers		5	0	5	$42.27	Bachelor's degree
17-2141	Mechanical Engineers		-1	5	4	$43.88	Bachelor's degree
17-2112	Industrial Engineers		-2	6	4	$48.85	Bachelor's degree
17-2199	Engineers, All Other		-1	4	3	$53.27	Bachelor's degree
	Logistic Occupations						
53-3033	Light Truck or Delivery Services Drivers		0	2	2	$14.75	Short-term on-the-job training
53-7062	Laborers and Freight, Stock, and Material Movers, Hand		-1	4	3	$12.42	Short-term on-the-job training
53-7063	Machine Feeders and Offbearers		0			$16.19	Short-term on-the-job training
53-7064	Packers and Packagers, Hand		-1	3	2	$9.53	Short-term on-the-job training
	Quality Assurance Occupations						
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors		0			$47.77	Bachelor's degree

Metal Processing & Fabrication Subsector: In-Demand Occupations (Grouped by Occupational Category)							
SOC Code	**Occupation**	**Fastest Growing**	**Net New Jobs**	**Replacement Jobs**	**Total Job Openings**	**Median Hourly Earnings**	**Education Level**
	Production Occupations						
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	41.50%	49	45	94	$17.62	Moderate-term on-the-job training
51-4121	Welders, Cutters, Solderers, and Brazers	7.30%	9	73	82	$22.71	Postsecondary non-degree award
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	9.00%	9	69	78	$16.08	Moderate-term on-the-job training
51-4041	Machinists	10.70%	10	65	75	$23.99	Long-term on-the-job training
51-9198	Helpers--Production Workers	14.80%	11	50	61	$13.08	Short-term on-the-job training
	Installation Occupations						
49-9071	Maintenance and Repair Workers, General	23.1%	24	54	78	$20.37	Moderate-term on-the-job training
49-9041	Industrial Machinery Mechanics	42.5%	21	19	40	$35.76	Long-term on-the-job training
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	16.7%	5	13	18	$37.25	Work experience in a related occupation
	Engineering Occupations						
17-2112	Industrial Engineers	19.0%	5	16	21	$48.85	Bachelor's degree
17-2141	Mechanical Engineers	0.0%	1	13	14	$43.88	Bachelor's degree
	Logistic Occupations						
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	17.1%	9	32	41	$12.42	Short-term on-the-job training
53-7051	Industrial Truck and Tractor Operators	11.1%	4	23	27	$20.50	Short-term on-the-job training
53-7021	Crane and Tower Operators	30.4%	9	14	23	$38.03	Long-term on-the-job training
	Quality Assurance Occupations						
17-2081	Environmental Engineers		--			$53.35	Bachelor's degree
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors		--			$47.77	Bachelor's degree

Food & Beverage Processing Subsector: In-Demand Occupations (Grouped by Occupational Category)							
SOC Code	**Occupation**	**Fastest Growing**	**Net New Jobs**	**Replacement Jobs**	**Total Job Openings**	**Median Hourly Earnings**	**Education Level**
	Production Occupations						
51-9111	Packaging and Filling Machine Operators and Tenders	22.5%	57	134	191	$12.31	Moderate-term on-the-job training
51-3011	Bakers	-2.9%	-4	108	104	$10.98	Long-term on-the-job training
51-3092	Food Batchmakers	17.3%	22	76	98	$13.93	Short-term on-the-job training
51-9198	Helpers--Production Workers	13.3%	13	62	75	$13.08	Short-term on-the-job training
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	37.0%	26	28	54	$27.30	Moderate-term on-the-job training
	Installation Occupations						
49-9071	Maintenance and Repair Workers, General	21.1%	11	27	38	$20.37	Moderate-term on-the-job training
49-9041	Industrial Machinery Mechanics	38.2%	16	18	34	$35.76	Long-term on-the-job training
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	18.2%	--	!	11	--	Work experience in a related occupation
49-9043	Maintenance Workers, Machinery	20.0%	--	!	10	--	Moderate-term on-the-job training
	Engineering Occupations						
19-1012	Food Scientists and Technologists	22.2%	6	12	18	$32.36	Bachelor's degree
	Logistic Occupations						
53-7064	Packers and Packagers, Hand	12.6%	15	72	87	$9.53	Short-term on-the-job training
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	26.9%	24	43	67	$12.42	Short-term on-the-job training
53-7051	Industrial Truck and Tractor Operators	25.0%	20	40	60	$20.50	Short-term on-the-job training
53-3031	Driver/Sales Workers	27.3%	12	21	33	$11.30	Short-term on-the-job training
53-3033	Light Truck or Delivery Services Drivers	22.2%	8	19	27	$14.75	Short-term on-the-job training
	Quality Assurance Occupations						

Priority Occupations

Priority Hiring Needs for Employers

A key question in the workforce needs assessment survey of advanced manufacturing firms asked employers about jobs for which they have "significant difficulty finding qualified applicants." This question identifies the workforce needs of employers and indicates the relationship between occupational supply and demand. When carefully analyzed, the result is a list of *Priority Occupations* that often reflect the presence of skilled labor shortages, skill gaps, or training program deficiencies.

Occupational employment projections, in contrast, do not indicate the relationship between occupational supply and demand. For example, employment demand in the local area may indicate 1,000 job openings for the fastest growing occupation (over a given outlook period). But what if all the training programs for that occupation (matched with the same outlook period) were preparing twice as many trainees as is needed to meet the demand? Oversupplying an occupation can result in serious labor market problems including unemployment, underemployment, and inefficient use of training resources. It's also extremely discouraging to job seekers to complete a training program and then find that you can't get a job related to the training program. Or that it could take years to get a training-related job.

Another method sometimes used to assess occupational supply and demand is to compare numbers from occupational employment projections with numbers from education/training program statistics. This method can be useful at times, but it can also offer an incomplete picture of supply and demand due to unreliable statistics and incomplete labor supply data. For example, employers often prefer to hire job seekers with previous experience rather than hire recent graduates or program completers, and there are no numbers to tell us about this portion of the supply population.

Employers that are having significant difficulty finding qualified applicants is a key labor market indicator and a relatively reliable assessment of occupational supply and demand. The survey responses to this question, therefore, not only indicate the workforce needs of employers in each subsector, but also serve as a tool to help us determine a list of the "Top Priority Occupations" for advanced manufacturing employers in Contra Costa County.

Top Priority Occupations (grouped by general skill level)

(grouped by general skill level, sorted by earnings)

HIGHER SKILL JOBS	2013 Jobs	2018 Jobs	% Change	Net New Jobs	Replace-ments	Total Openings	Median Earnings
Chemical Engineers	84	85	1%	1	14	15	$68.34
Industrial Production Managers	340	346	2%	6	41	47	$58.89
Electrical Engineers	443	464	5%	21	54	75	$49.55
Industrial Engineers	386	390	1%	4	44	48	$48.85
Mechanical Engineers	388	410	6%	22	62	84	$43.88
Software Developers, Applications	1,629	1,649	1%	20	97	117	$43.68
Electronics Engineers (Except Computer)	411	434	6%	23	50	73	$43.53
Cost Estimators	593	646	9%	53	56	109	$34.63
MIDDLE SKILL JOBS	**2013 Jobs**	**2018 Jobs**	**% Change**	**Net New Jobs**	**Replace-ments**	**Total Openings**	**Median Earnings**
Electricians	1,231	1,329	8%	98	166	264	$38.48
Industrial Machinery Mechanics	454	516	14%	62	43	105	$35.76
Millwrights	99	98	-1%	-1	11	10	$31.70
Electrical and Electronics Repairers, Commercial and Industrial Equipment	118	121	3%	3	15	18	$31.03
Chemical Plant and System Operators	48	43	-10%	-5	13	8	$27.71
Machinists	320	317	-1%	-3	35	32	$23.99
Heavy and Tractor-Trailer Truck Drivers	1,565	1,564	0%	-1	187	186	$21.53
Prepress Technicians and Workers	104	90	-13%	-14	27	13	$18.14
LOWER SKILL JOBS	**2013 Jobs**	**2018 Jobs**	**% Change**	**Net New Jobs**	**Replace-ments**	**Total Openings**	**Median Earnings**
Maintenance Workers, Machinery	116	117	1%	1	11	12	$29.33
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	23	23	0%	0	3	3	$20.74
Maintenance and Repair Workers, General	2,498	2,619	5%	121	229	350	$20.37
Printing Press Operators	177	178	1%	1	19	20	$17.27
Computer-Controlled Machine Tool Operators, Metal and Plastic	57	64	12%	7	5	12	$17.09
Light Truck or Delivery Services Drivers	1,950	2,068	6%	118	193	311	$14.75
Print Binding and Finishing Workers	39	39	0%	0	7	7	$14.63
Team Assemblers	759	719	-5%	-40	118	78	$13.44
Laborers and Freight, Stock, and Material Movers, Hand	3,636	3,730	3%	94	602	696	$12.42
Driver/Sales Workers	779	868	11%	89	75	164	$11.30

Data for Contra Costa County

Method for Determining the "Top Priority Occupations"

Based on the responses to the supply/demand survey question, the first step was to convert the raw survey job titles to comparable (sortable) titles. The titles were then sorted by sub-sector and included the overall number of workers reported by each employer.

The second step involved analyzing job titles and employment data to filter out titles that represent very few jobs or employment opportunities. We looked for titles that were reported by at least three employers in the survey or, if less than three, that represented a significant number of job opportunities. We also considered the employer's reasons given for why they had significant difficulty finding qualified applicants for those jobs.

The third step was to validate the occupations on the refined list with occupational employment projections to ensure that they had a good number of job opportunities across all industry sectors for that occupation. The data was cross-checked between survey responses and occupational employment projections.

Finally, the list was sorted and filtered for the Priority Occupations based on the number of projected job openings that were identified in the workforce needs assessment survey by the employers. These important occupations are listed in the Top Priority Occupations table (grouped by high, middle and low skill jobs), and are also profiled in detail in a report entitled *Job Opportunities in Advanced Manufacturing*. The detailed profiles include descriptions, qualifications and skill requirements, training options, and career pathways.

Middle-skill occupations include jobs that generally require at least one year of skills development beyond high school but less than a bachelor's degree. The postsecondary skills development may include education or training, or on-the-job training, or apprenticeship training, or occupations that generally require one year or more of previous work experience.

Definitions used in the Top Priority Occupations table:	
Middle Skill Jobs	There has been much discussion in recent years about the importance of "middle skill jobs," with the common definition of "more than high school but less than a bachelor's degree." Middle-skill occupations are defined here as including jobs that generally require at least one year of skills development beyond high school but less than a bachelor's degree. The postsecondary skills development may include education or training, or on-the-job training, or apprenticeship training, or occupations that generally require one year or more of previous work experience.
2013 Jobs	Estimated employment in Contra Costa County for the 2013 base year.
2018 Jobs	Projected employment in Contra Costa County for the year 2018.
% Change	Growth rate in Contra Costa County over the 5 year projections period. Divide this number by 5 to get an annual growth rate, although keep in mind that employers don't usually grow at a constant yearly rate.
Net New Jobs	The difference between the estimated 2013 employment and the projected 2018 employment.
Replacements	Replacement jobs are the result of workers leaving the occupation or labor force and, as a result, creating an opportunity for someone new to work in the occupation. Turnover includes replacements, but also includes jobs that need to be filled due to workers who simply move from one employer to another – without leaving the same occupation.
Total Openings	Combined new jobs and replacement jobs in Contra Costa County (but doesn't include the kind of turnover where people change jobs without also changing occupations).
Median Earnings	The median wage in Contra Costa County divides the earnings distribution into two equal parts: one-half of the cases falling below the median and one-half above the median.
EMSI	Economic Modeling Specialists Intl. is a firm that provides high-quality employment data and economic analysis. www.economicmodeling.com/Share

Workforce Skill Requirements

The Advanced Manufacturing Competency Model was developed through a collaborative effort involving the U.S. Department of Labor's Employment and Training Administration and leading industry organizations to identify the knowledge and skills needed by today's manufacturing workforce that will meet industry's needs. The model illustrates how occupational and industry competencies build on a foundation of personal effectiveness, academic, and workplace competencies that represent the skills, knowledge, and abilities essential for successful performance in the Advanced Manufacturing industry. The Skills Certification System endorsed by the National Association of Manufacturers is grounded in the *Advanced Manufacturing Competency Model*. The model serves as a roadmap of the skills needed by workers entering and then advancing in careers in the manufacturing sector.

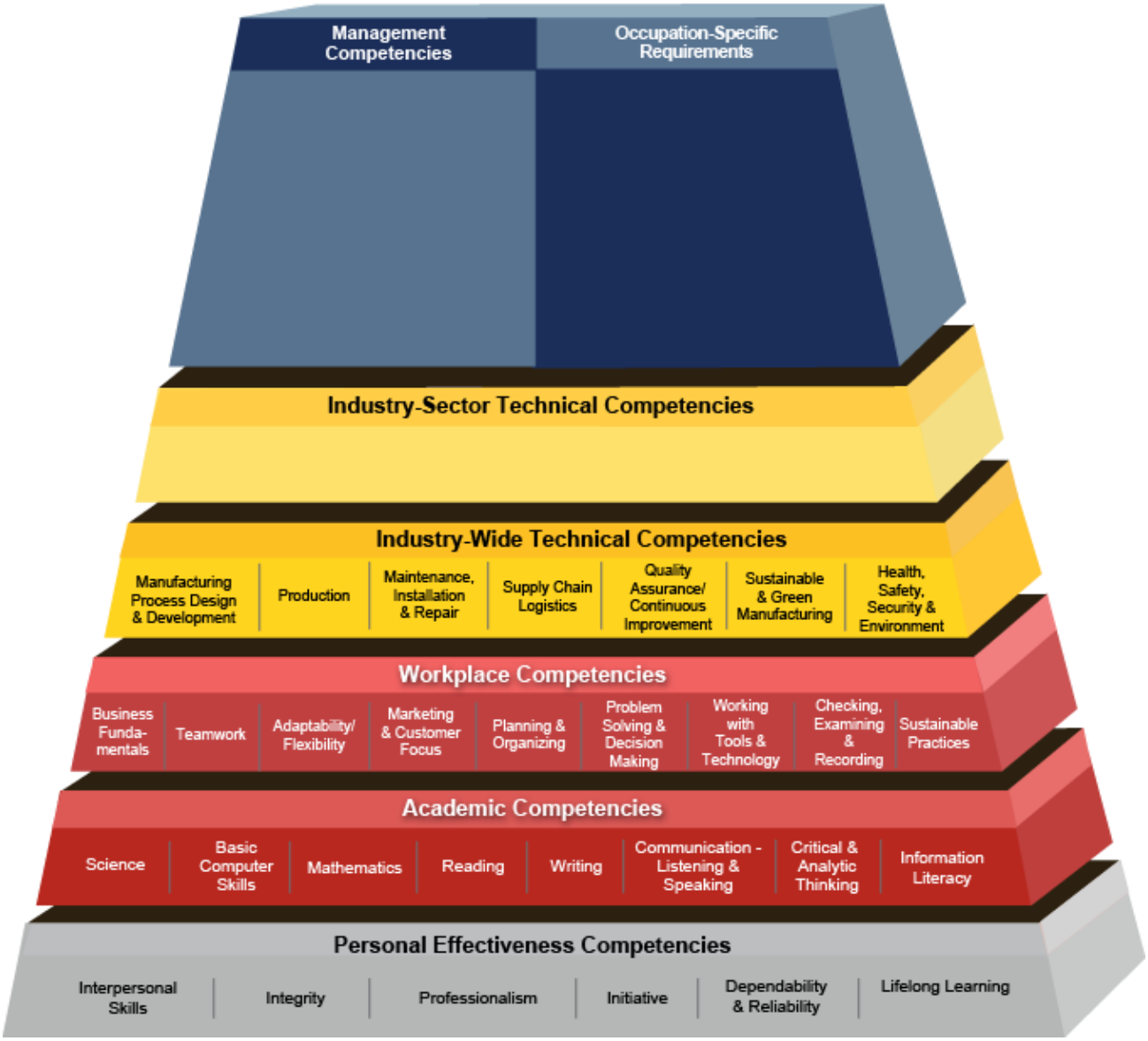
Occupation related skills for high-demand occupations are matched with critical industry certifications in such areas as machining, welding, fabrication, automation, fluid power, mechatronics, transportation/distribution, and logistics. Core technical and foundational skills are also identified.

Quint Measuring Systems

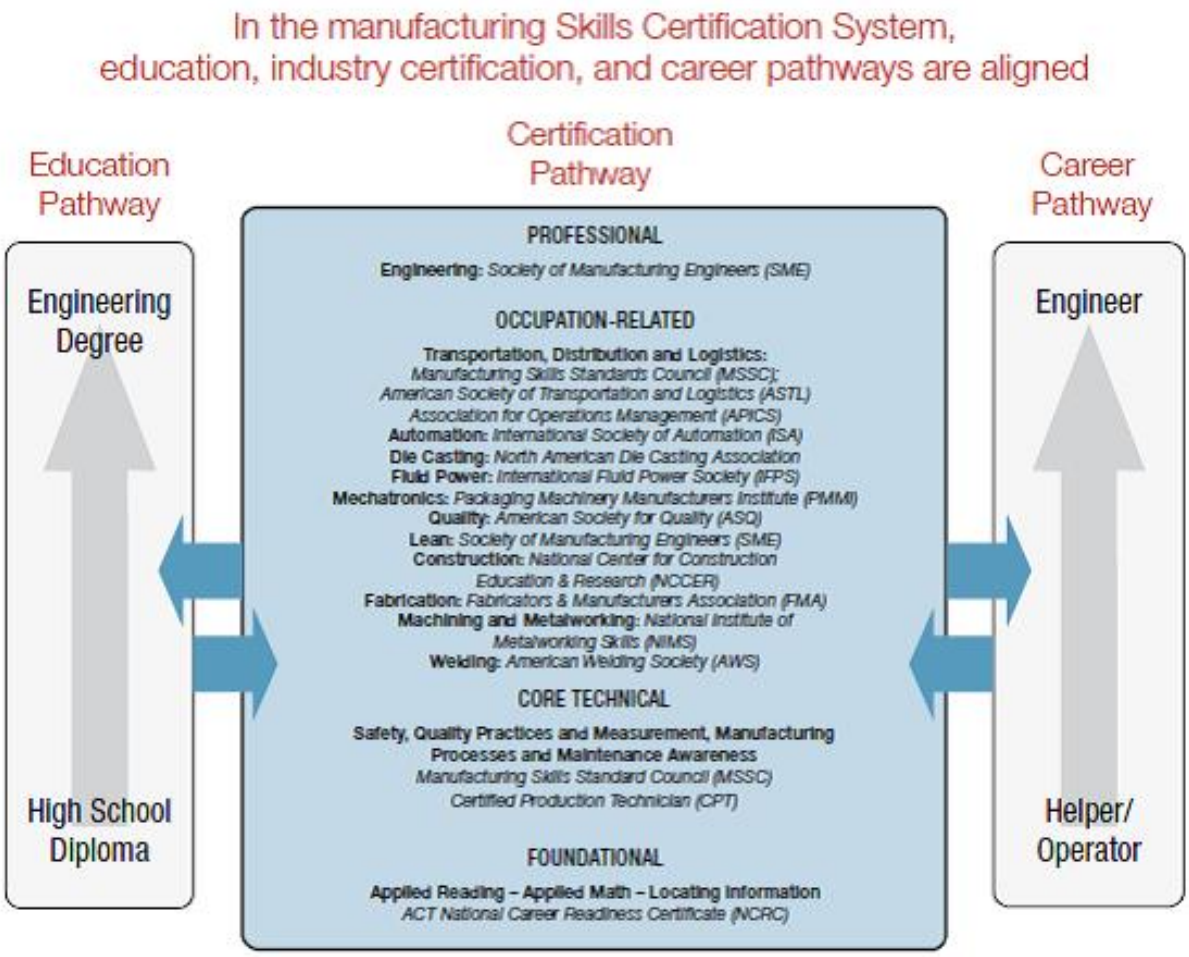
Walnut Creek, Contra Costa County

Quint Measuring Systems is a small manufacturing company that specializes in plastic measuring tools, machined to 1,000", then hot-stamped or silk-screened with the appropriate information.
www.quintmeasuring.com

Advanced Manufacturing Industry Competency Model



The Skills Certification System links education and work through manufacturing-related industry certifications. Traditional education pathways (left column) and occupation/career pathways (right column) in manufacturing are aligned through "stackable" industry-based certifications (middle column).



For more information on the Advanced Manufacturing Competency Model, see http://www.careeronestop.org/competencymodel/pyramid.aspx?hg=Y

Workforce Needs Assessment

In order to address industry's needs for a skilled workforce in Contra Costa County, a total of 92 advanced manufacturing employers were surveyed representing 18 different manufacturing subsectors. A follow-up meeting with representative employers was also conducted with about one in three survey respondents to validate the survey results and to better understand their individual and collective workforce needs.

Finding Qualified Candidates

What percentage of the candidates who apply for your open positions meet your minimum requirements?

When asked this question, employers expressed concern about the qualifications of the job candidates. The overall response (for all subsectors) can be interpreted as **"Advanced manufacturers in Contra Costa County report that about one out of two candidates who apply for their open positions do not meet their minimum requirements."**

While this is troubling and frustrating for employers, it should be noted that this by itself doesn't necessarily indicate a skills gap - because it includes some job applicants who apply for jobs when they simply don't understand if they're qualified or not. But what this does tell us is that a) far too many job applicants don't pay attention to or understand the requirements of the jobs they apply for, and b) far too many employers do a poor job of clearly communicating the actual requirements of their jobs.

The following table ranks the subsectors with the highest and lowest percentage of job applicants who meet the minimum qualifications of the jobs for which they apply. The subsectors at the top of the list (Furniture, Petroleum, Machinery, and Life Sciences) have the best numbers – i.e. they get the lowest percentage of unqualified job applicants (or conversely, the highest percentage of qualified job applicants). The subsectors at the bottom of the list (Transportation, Food & Beverage Processing, and Digital & Electronic Devices) have the worst numbers and get the lowest percentage of qualified job applicants.

Subsector	% of Job Applicants Who Meet Minimum Qualifications (Average)
Furniture	71%
Petroleum Refining & Products	69%
Machinery	67%
Life Sciences	66%
Building Materials	58%
Printing	56%
Polymers & Coatings	48%
Industrial, Agriculture & Household Chemicals	41%
Environmental Control Systems	40%
Electrical Equipment & Appliances	40%
Metal Processing & Fabrication	38%
Digital and Electronic Devices & Components	36%
Food & Beverage Processing	35%
Transportation	23%

If you are you having difficulty recruiting qualified workers for reasons other than a lack of specific skills and experience, what are some of the biggest challenges you encounter?

Of the employers responding to this question, about one out of three reported that a lack of "work ethics"" was one of their biggest challenges in recruiting qualified applicants. From an employer's point of view, good work ethics generally include the following characteristics:

- Reliability (punctual, dependable)
- Dedication (going beyond what is expected or required)
- Productivity (efficient and highly productive)
- Cooperation (teamwork, respectful of others)
- Character (self-disciplined, trustworthy)

Biggest Challenges in Finding Qualified Workers Besides Specific Skills and Experience

Subsector	Background Check/ Drug Testing	Work Ethics	Transportation Issues	Work Experience	Training	Reading & Math Skills	Technical Skills	Wages	Attitude/ Willingness to Work
Food & Beverage Processing	drug test	willingness to work		not enough experience lack of job participation			no one in market does welding and trades, so skills in manufacturing are hard to find		
Printing	background check long shifts are hard to schedule	finding self-directed workers that don't need to be told their daily procedures	driver's license transportation issues						
Petroleum Refining & Products	competency, and exposure to industry			level of experience in crafts			specialized skill sets are hard to find		
Industrial, Agriculture & Household Chemicals	not being able to do the job	work ethics, integrity, honesty	distance from skilled workers - none in this area		lack of vocational training in local area		finding skilled people in local area location	wages/competition with other employers in our industry	
Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment	inadequate labor pool in this region green cards and legal workers		employee transportation and related costs (bridge pass, gas prices, etc)	experience in our industry,	costly and time consuming to train people and to do what we want	lack of education and grammar skills,			

Subsector	Background Check/ Drug Testing	Work Ethics	Transportation Issues	Work Experience	Training	Reading & Math Skills	Technical Skills	Wages	Attitude/ Willing-ness to Work
Metal Processing & Fabrication	language barrier drug testing, background check, drug testing, drug testing, work ethics failing drug tests has always been an issue medical or drug screen passing no one in local area has the right combination of skills and experience reading and following instructions, work ethics, following directions, ability to read a measuring tape common sense, standing on their feet for the whole shift	work ethics	some people have transportation issues bad driving record,			reading and math aptitude and skills test (some people just don't pass the test),	high skilled positions or jobs that require trade knowledge are always difficult to fill	pay rate isn't as high as some other companies our pay range makes it difficult to find responsible, dedicated workers	drive and initiative
Digital and Electronic Devices & Components	lack of industry background for niche (specialized) jobs lack of self-initiative and ability to effectively work with others we're a small company so employees need to be a good fit work ethics, efficiency, easily distracted		transportation issues					difficult to compete with wages paid by other manufacturers in Alameda and Santa Clara Counties, Silicon Valley difficult to compete with wages paid by other manufacturers in S	
Electrical Equipment & Appliances			location makes it difficult to fill positions due to public transportation not being convenient	lack of experience with our specific machinery					

Subsector	Background Check/ Drug Testing	Work Ethics	Transportation Issues	Work Experience	Training	Reading & Math Skills	Technical Skills	Wages	Attitude/ Willing-ness to Work
Transportation	drug testing housing costs for employees								
Furniture	insubordination bad attitudes	work ethics,	transportation issues,						
Other Subsectors	criminal background, workplace compatibility, job gaps in past employment history undocumented workers, we recruit from Southern California and from out of state to find the skill sets we need	work ethics	transportation issues,					salary competition with other companies	people that just don't want to work interest in doing hard physical work

Required Competencies

Considering employees you have recently hired, what specific knowledge, skills, abilities or personal characteristics are lacking?

As reported by employers, the most common quality lacking in recent hires are work ethics. Second to that is skillset, or gaps in the required knowledge, skills or abilities.

From an employer's point of view, good work ethics generally include the following characteristics:

- Reliability (punctual, dependable)
- Dedication (going beyond what is expected or required)
- Productivity (efficient and highly productive)
- Cooperation (teamwork, respectful of others)
- Character (self-disciplined, trustworthy)

Sub-Sector	What specific knowledge, skills, abilities or personal characteristics are lacking in your recent hires?
Food & Beverage Processing	• driver - work ethic (call in sick, no show for work) • millwright & instrument tech - troubleshooting skills • production worker - equipment operator skills • warehouse worker – work ethic (commitment, attendance)
Printing	• all jobs - work ethic (attendance), problem solving skills • prepress - didn't follow directions • pressman - drug and alcohol issues, work ethic, skill set for particular press • production operator - speed and efficiency in work task • warehouse worker - heavy lifting
Petroleum Refining & Products	• all jobs - refining knowledge • engineers - project management experience • process control – experience with DCS (control system used)
Industrial, Agriculture & Household Chemicals	• driver - work ethic • line worker - willingness to work • maintenance - maintenance experience (of any kind, including high school shop!) • operator - educational background (we had to teach them chemistry and math) • operator - work ethic, attitude • plant operator - experience
Polymers & Coatings	• process engineer - business acumen • production & tech - work ethic (lazy, don't want to work)
Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment	• driver - work ethic (not putting much effort into job duties) and organizational/prioritizing skills • lab tech - intelligence and function • manufacturing tech - high school diploma • packing - green card
Building Materials	• heavy duty repairman - skillset, willingness to work night shift

Sub-Sector	What specific knowledge, skills, abilities or personal characteristics are lacking in your recent hires?
Metal Processing & Fabrication	• apprentice sheet metal manufacturer - driver's license • entry level manufacturer - work ethic (late to work, call in sick) • estimator - sales skills • fabricator - work ethic • fork lift driver - timeliness • general labor - work ethic (on phone all the time and texting) • laborer - press-brake operations • laser tech - knowledge (of the machine), our procedures (with the specialized medical equipment we make) • lead machinist - motivation, leadership skills, work ethic • machine operator - personal responsibility • machine operator - work ethic • machinist - drug testing • machinist - skillset (lacked what they claimed to have) • machinist - work ethic, skillset • maintenance/machine operator - maturity, experience, soft skills • planner - overall manufacturing knowledge • production operator - skillset, work ethic (late to work, called in sick) • production worker/driver - welding skills • shipping - honesty (theft of money), work ethics • shop production - work ethic
Machinery	• diamond turning tech - skillset (for advanced work required), ability to follow procedures • senior generating technician - experience in glass optics
Environmental Control Systems	• shop worker - work ethic
Digital and Electronic Devices & Components	• assembler - work ethic • assembler and material handler - learning capability, pride in work quality, self-motivation, basic reading comprehension, computer skills • RF engineer - work ethic • marketing – work ethic (laziness, lack of commitment to the business) • warehouse manager/production supervisor & buyer/planner sr & manufacturing engineer - degree, analytical/critical thinking/planning, organization/communication skills, pride in work quality, collaboration, project management, self-motivation
Electrical Equipment & Appliances	• electrical engineer - skillset
Transportation	• marine systems - industry knowledge • parts cleaner - work ethic, timeliness, self direction
Furniture	• fabricator - good attitude, team player, ability to follow shop directions • shipping clerk – insubordinate • woodcutter - not focused

Training Needs

Do you see a need for new or more effective pre-employment (or soft skills) training - designed to better prepare your new hires for entry level jobs? If YES, please describe the type of training you believe is needed and for what job classifications.

Overall, 72% of the employers surveyed said "Yes" – that they believe there is a need for new or more effective pre-employment (or soft skills/work readiness) training. The table below indicates (by sub-sector) the type of training employers say is needed.

Sub-Sector	What type of new or more effective pre-employment (or soft skills) training is needed?
Food & Beverage Processing	• take initiative, read, write, basic mathematics • forklift training and safety on other heavy equipment, truck skills • technology in manufacturing, computer, math, English skills, English as a second language
Wood & Paper Products	• communication and organization skills, listening skills, wood working, and Cal OSHA safety
Printing	• basic print manufacturing, computer skills, graphic design/prepress • basic skills: English, math, computer, communication • computer skills • computer skills specific to manufacturing, printing, graphic arts • English as a second language, graphic design, running/working with large machinery • printing production training, software training, graphic design • training in press operations, production, computer skills
Petroleum Refining & Products	• need to ramp up the process technology (PTEC) and electrical technology (ETEC) programs at Los Medanos College and start a machinist program • need to support the process technology (PTEC) and electrical technology (ETEC) programs at Los Medanos College
Industrial, Agriculture & Household Chemicals	• advanced chemistry and math • mechanic program, basic mechanical engineering program, work ethics, computer, literacy skills • soft skills (coworker respect, timeliness, willingness) and vocational skills (mechanical, auto shop, computer and controls automation)
Polymers & Coatings	• business environment experience, customer service, communication and public speaking skills • STEM courses (science, math, tech)
Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment	• computer experience and skills, graphics and design • dental manufacturing • dental manufacturing geared toward the digital side • dental manufacturing, soft skill training would be a waste of money (for them) • dental tech and terminology, interviewing skills, artistic and hands on skills, job shadowing • English as a second language, communication skills • science background, manufacturing realm exposure, computer skills • self motivating and work ethic, basics of dental manufacturing
Building Materials	• safety training, machinist, welding, mechanical • work ethics (for people 20 yrs and younger), teamwork, math skills

Sub-Sector	What type of new or more effective pre-employment (or soft skills) training is needed?
Metal Processing & Fabrication	• apprenticeship, machinist program • CNC laser (on CNC machines) • CNC operator, programming, leadership, line supervision • factory training • machine shop training, measuring with micrometers, reading basic blue prints, engineering CAD • machining and accompanying on-the-job training program • math and reading skills, basic welding, electrical maintenance, troubleshooting • metal shop, steel manufacturing training, general trades classes and training • millwright, mechanical/machinist • press-brake operator, welding, metal fabrication • sheet metal works training, HVAC and duct works, roofing materials, math, work ethics • soft skills, attention to detail, power tool use and application, organizational • soft skills, math, production line • vocational programs at community colleges, metal and wood shop classes at high schools, ESL • work ethics, CNC machinist/machine operator, programming skills • work ethics, machinist training, welding, blueprint reading, math skills, working with others, machinist, shop help • work ethics, maintenance, fork lift, manufacturing process, internships, job shadowing • work ethics, punctuality, metal polishing, welding, working with metal
Machinery	• electronics assembly and repair, computer skills, CAD • optics manufacturing tech program, project management training for high tech environment
Environmental Control Systems	• basic math, power tool, wood shop, basic manufacturing • mechanical, brazing, bending metal, small tool assembly
Digital and Electronic Devices & Components	• basic reading, math, English, communication skills, large presses and other machinery, hot stamping, CNC machining • communication, technical training (computer savvy), production/distribution • hands-on engineering and testing (in manufacturing) training • on-the-job cross-training with employers, basic electronics • technical, engineering, pre-engineering training • work ethics
Electrical Equipment & Appliances	• critical thinking for all manufacturing jobs, on-the-job training • machining and manufacturing assembly training • trade skills, welding, sheet metal, CNC training for machinists
Transportation	• basic vocational mechanical skills, electrical, painting • foundation of manufacturing, assembling, fabricating, basic machining
Furniture	• dependability, commitment, math skills • people skills, teamwork, listening • work with millworkers and cabinetmakers union start program
Other Subsectors	• on-the-job training with employers

Do you have existing employees with skill needs that may require new or updated training? If YES, please describe the type of training you believe is needed and indicate for what job classifications.

Overall, 43% of the employers surveyed said "Yes" – that they have existing employees with skill needs that may require new or updated training. The table below indicates (by subsector) the type of training employers say is needed for their existing employees.

Sub-Sector	What type of training is needed for your existing employees?
Food & Beverage Processing	• able to investigate problems and communicate solutions • communication skills • manufacturing equipment training • skilled production position (crew leaders) • troubleshooting • truck driver training
Printing	• computer skills training (e.g. Excel, Word, Access) • English as a second language • software (like latest Adobe updates) • work ethics
Industrial, Agriculture & Household Chemicals	• computer controls, automation, timeliness • hazmat training (for new and updated) • welding, pipe fitting, trade skills
Polymers & Coatings	• English as a second language, math skills
Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment	• associate (2-yr) degree in engineering • dental manufacturing training customized to meet the needs of my business and my employees • digital CAD/CAM used for dental manufacturing • English as a second language, communication skills
Metal Processing & Fabrication	• CNC operations and manual operations • CNC operations and programming • English as a second language • English as a second language, writing, reading • machine shop training, measuring with micrometers, reading basic blue prints, engineering CAD • machinist • math, blue print reading, soldering gun, electric and mechanic assembly • quality and procedural • safety training (for all jobs) • soft skills, machining • update training on new environmental laws • updated training for our field of powder coating • updated training in machining and leadership • work ethics
Machinery	• optical manufacturing update training, lean manufacturing and Sigma Six manufacturing
Digital and Electronic Devices & Components	• basic electronics • computer literacy • computer programming for automation of production • leadership training for engineers and supervisors • machinery operation and maintenance • problem analysis and solving, critical thinking, planning and effective time management, upgrade computer skills, project management, data-based decision making • safety training

Sub-Sector	What type of training is needed for your existing employees?
Electrical Equipment & Appliances	• machinist training for our lower level employees
Transportation	• mechanical skills, electrical, painting
Other Subsectors	• English as a second language, machining and heavy machining operations

What outside training do you currently utilize and how satisfied are you with it?

Manufacturers reported a wide variety of outside training sources, ranging from equipment manufacturers to software vendors to community colleges.

Sub-Sector	What outside training do you currently utilize and how satisfied are you with it?
Food & Beverage Processing	• Kepner-Tregoe (management consulting and training), OZ Accountability Training, HRDQ (experiential learning resources for HR) • SFIB/School for International Business (training on exporting, importing and international business) for supervisors
Printing	• Cal OSHA • forklift training recommended by Cal OSHA • printing association and webinars with software company - expensive, but good • Printing Industries of Northern California (PINC) - for updated skills • training provided by equipment manufacturer • Visual Media Alliance - excellent programs
Petroleum Refining & Products	• recruit from the process technology (PTEC) program at Los Medanos College
Industrial, Agriculture & Household Chemicals	• CDMS hazmat training - very satisfied • Cintas first aid and safety training - very satisfied • Contra Costa College, Diablo Valley College • Los Medanos College - satisfied!
Polymers & Coatings	• AutoCAD seminars - they are ok • partnered with Los Medanos College in STEM/process tech curriculum • soft skills training has been mixed (some good and some irrelevant)
Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment	• company product seminars for new technology in teeth • Oakland or other places for seminars - we are satisfied with it but it is expensive • product suppliers and manufacturers • tech consultants and specialists from vendors
Building Materials	• Caterpillar equipment training - very good
Metal Processing & Fabrication	• American Management Association (AMA) for management training - pretty satisfied • Cal OSHA/Turner forklift safety training - greatly satisfied • corporate has continuous improvement and leadership training - very satisfied • equipment reps provide tech seminars, Fred Prior Seminars are ok for low level business training • NDT.org (Non Destructive Testing) and Valley Industrial X-Ray training - they're fine • nothing recently (since a machinist school closed) • Nucor Corp performance training - totally awesome • software company trains on-site • union hall - it's good

Sub-Sector	What outside training do you currently utilize and how satisfied are you with it?
Machinery	• optical trade shows
Digital and Electronic Devices & Components	• bought advanced CAP tool and training - was effective • we have a vendor that trains for software, communication, project management
Transportation	• Diablo Valley College • our business is unique as we need water specialization credentials, so we have to send them to Alameda to train as there's nowhere closer
Furniture	• Laney College and Los Medanos College for CNC and CAD training

What could public investment in education and training do to assist you in recruiting or training qualified workers, or in training existing employees?

This question generated a variety of responses, suggesting that it was interpreted differently by different survey respondents. Nevertheless, the responses are interesting and reveal some common threads. Combined with our follow-up face-to-face interviews with about 1 in 3 survey respondents, it would appear that most manufacturers think that "public investment in education and training" should include providing teens and young adults with more opportunities to learn work readiness skills, to cultivate a good work ethic, and to have opportunities to explore skilled trade crafts through shop classes, vocational education programs, and work experience opportunities.

Others, of course, were most interested in job-specific training that would address their workforce needs.

Sub-Sector	What could public investment in education and training do to assist you in recruiting or training qualified workers, or in training existing employees?
Food & Beverage Processing	• help build company and add to the knowledge of our employees • pre-screening of job applicants • provide a variety of training such as technology in manufacturing, computer, math, English skills, English as a second language, refrigeration skills, electrical skills, basic mechanical skills • provide electrical, pipefitting, welding and instrument tech training programs • provide SFIB (School for International Business) and AIB (School of Baking) type classes
Wood & Paper Products	• provide us with educated people, actively searching for gainful employment
Printing	• programs for printing manufacturing • provide classes in English, math, computer, and communications • provide employees that are a better fit • provide training on what's new in printing: bindery and design • provide training to improve existing skill sets; postal training would also be helpful
Petroleum Refining & Products	• provide a machining program, improve the process technology (PTEC) program • provide shop and tech classes in high school, support the PTEC and ETEC programs

Sub-Sector	What could public investment in education and training do to assist you in recruiting or training qualified workers, or in training existing employees?
Industrial, Agriculture & Household Chemicals	• better training would allow workers to fit into the job quicker and move up faster in rank • provide stronger math and science programs • provide training on overall operations and procedures • support/maintaining the process technology (PTEC) program at Los Medanos College • teach more trade skills
Polymers & Coatings	• help us recruit more females and more diversity in manufacturing jobs • provide English as a second language classes • provide STEM training
Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment	• allow specific business owners to design and manage the training themselves • provide affordable training that close to where people work • provide basic computer operations and applications training • provide basic dental manufacturing training • provide dental lab tech and terminology training, interviewing skills, artistic and hands on skills, job shadowing • provide industrial sewing class • provide internship in manufacturing program • provide histotechnologist training
Building Materials	• provide more training in soft skills and critical thinking in high schools and community colleges
Metal Processing & Fabrication	• get vocational education back into the schools (i.e. metal and wood shop, HVAC, auto) • improving the quality of the workforce will result in higher wages • provide a basic understanding of nondestructive testing for ultra sonic testing (sound wave) and radiation/x-ray testing • provide a larger trained workforce which will help us grow our business • provide a machinist program like the one they had at Diablo Valley College • provide CNC laser training • provide estimator course or training • provide funding for machine operator/machinist training • provide growing businesses with reliable, good-attitude people • provide metal/welding program • provide more qualified job applicants • provide new employees that have an interest in learning a skill • provide soft skills training in high schools • provide some sort of encouragement to middle school students to pursue science and math (STEM fields) • provide specialized equipment training in machining • provide technical education in high schools and emphasize its importance • provide training on soft skills as well as technical skills • provide training programs that familiarize people with manufacturing, machinery, and forklift operations • provide us with good quality employees that will stay - it's costly for us to not have good employees • publically funded training lowers our costs which make us more efficient and makes our product generate new business • whatever can be done to help revitalize the manufacturing trades
Machinery	• provide a better trained workforce • provide optical tech training including internships and on-the-job training • provide people for internships (to learn the ropes)
Environmental Control Systems	• need to teach the basics in manufacturing as well as good work ethics • provide after-hours classes for assembly, manufacturing and metal workers

Sub-Sector	What could public investment in education and training do to assist you in recruiting or training qualified workers, or in training existing employees?
Digital and Electronic Devices & Components	• help us find and train people with manufacturing skills • provide APICS (Association for Operations Management) type materials management training, with stronger math and science • provide hands-on engineering and testing in manufacturing training • provide manufacturing skills training • provide more programs in high schools that lead toward advanced degrees • provide officer leadership training • provide programs to teach CNC, hot stamping process and computerized equipment
Electrical Equipment & Appliances	• provide school shop classes for welding and mechanical • providing quality training would give our employees a better opportunity to advance to higher skilled jobs • teach LED trade manufacturing skills as it is a growing field
Transportation	• offer grants to put people in programs to learn mechanical, electrical and painting skills • provide soft skills training for high school kids and auto, wood and metal shop courses
Furniture	• provide shop classes in high school like woodshop, art, metal • provide training programs for machining, carpentry and vocational skills
Other Subsectors	• would like to see better speaking, reading, writing, customer service and computer skills

Conclusions

Findings

Manufacturing is important to Contra Costa County's economy for a variety reasons, including the job opportunities and the above average wages that it offers. The major subsectors are relatively stable and mature industries that do not anticipate much new job growth, if any. In fact most subsectors are projected to show a loss of jobs over the next five years. Despite the overall decline in manufacturing employment in general, advanced manufacturing firms in Contra Costa County project net new annual job growth of around 2.5% over the next 3-5 years. In addition, there is expected to be a significant number of replacement job openings in both traditional and advanced manufacturing firms due to retiring baby boomers.

Consistent with national trends, manufacturing's share of employment in Contra Costa County will continue to be under pressure due to ongoing productivity improvements and global competition. Therefore, local manufacturers should not be expected to create mass employment on the scale that it did decades ago. Besides the projected job openings from both new job growth and replacement jobs, it is also important to support this sector given the high job multipliers associated with manufacturing. Growth and spending by the manufacturing sector directly and indirectly supports job growth across a wide range of industries within Contra Costa County. Many local jobs in the construction, transportation, and professional and technical services (PSTS) sectors are directly linked to a healthy manufacturing sector. Job opportunities are also created by local vendors across the entire supply chain due to local spending by manufacturing firms.

Advanced Manufacturing Cluster

Contra Costa County's advanced manufacturing cluster includes a diverse base of companies across 19 manufacturing subsectors. The largest subsectors based on the number of local jobs include:

1. Petroleum Refining & Products
2. Digital and Electronic Devices & Components
3. Metal Processing & Fabrication
4. Life Sciences including Pharmaceuticals, Biotechnology, Medical Devices & Equipment; and
5. Food & Beverage Processing

These five subsectors are expected to grow over the next three years as the economy expands. In response to a workforce needs assessment survey, employers in these five subsectors indicated that they anticipated hiring workers either for new jobs or replacement jobs over the next three years.

Job Openings

Despite the overall decline in employment within Contra Costa County's manufacturing sector, there are a number of occupations with job openings due to new job growth or replacement jobs that will provide plentiful employment opportunities for job seekers. While manufacturing jobs have declined over the past several decades, a number of production occupations have seen a positive increase. Advanced manufacturing firms in most subsectors also anticipated new job growth over the next three years. Eight of the subsectors plan on employment growth that will be above the average for the manufacturing sector as a whole. The three fastest growing subsectors over the next 3-years include Electrical Equipment & Appliances (71.2%), followed by Digital and Electronic Devices & Components (33.4%) and Polymers & Coatings (18.8%). The three subsectors that anticipate the largest number of new jobs over the next three years include Digital and Electronic Devices & Components (484 jobs), Metal Processing & Fabrication (131 jobs), and Polymers & Coatings (95 jobs).

When advanced manufacturing firms were asked about how many employees they expected to have working in 6-12 months, staffing levels were up about 2.5%. Overall, advanced manufacturing firms in Contra Costa County expect 861 net new job openings.

As the baby boom population retires, it will create a large number of openings for replacement jobs across most subsectors. There is concern that there will be a shortage of skilled workers needed to replace the retiring baby boomers, and to meet the needs of manufacturing firms that are reshoring (bringing manufacturing jobs back to the United States).

Anticipated Job Growth by Advanced Manufacturing Firms in Contra Costa County

Subsector	2013 Employment	2016 Employment	Net New Jobs	% Change
Petroleum Refining & Products	3,460	3,497	37	1.1%
Digital and Electronic Devices & Components	1,448	1,932	484	33.4%
Metal Processing & Fabrication	1,373	1,504	131	9.5%
Life Sciences, including Pharmaceuticals, Biotechnology, Medical Devices & Equipment	921	909	-12	-1.3%
Food & Beverage Processing	875	845	-30	-3.4%
Polymers & Coatings	505	600	95	18.8%
Printing	318	365	47	14.8%
Industrial, Agriculture, & Household Chemicals	298	281	-17	-5.7%
Machinery	166	180	14	8.4%
Electrical Equipment & Appliances	73	125	52	71.2%
Furniture	59	64	5	8.5%

Priority Occupations

Advanced manufacturing firms responding to the needs assessment survey identified a number of occupations for which they have significant difficulty finding qualified workers. These priority occupations reflect the presence of skilled labor shortages, skill gaps, or training program deficiencies. The priority occupations identified by employers need to be priority occupations for workforce and economic development organizations as well.

Workforce Pipeline

Enhancing the flow of qualified new workers into the workforce with the right skill set to meet employer needs creates a comparative advantage for the region. Most young people today fail to consider the possibility of manufacturing as a career and are unaware of the necessary skills required to pursue or acquire a job in this sector. Similarly, the K-12 system does not adequately impart the skills needed or educate students about career opportunities in manufacturing. In fact, the media has effectively portrayed manufacturing as a dying industry in the U.S. with jobs being relocated overseas. Consequently, the younger generations have misperceptions about employment in this sector and are not considering manufacturing as a viable career choice.

Skills Requirements

As reported by employers, the most common quality lacking in recent hires are work readiness skills, including work ethics, followed by gaps in a candidate's academic and technical skills.

From an employer's point of view, good work ethics generally include the following characteristics:

- Reliability (punctual, dependable)
- Dedication (going beyond what is expected or required)
- Productivity (efficient and highly productive)
- Cooperation (teamwork, respectful of others)
- Character (self-disciplined, trustworthy)

Manufacturers report that they experience difficulty finding qualified workers with basic academic and technical skills. All manufacturing workers need adequate foundational competencies like math, science, reading comprehension, and writing. They need strong workplace competencies like computer literacy, teamwork, and critical thinking. Finding workers with these basic foundational skills and competencies has been a challenge for many employers.

On top of these basic skills, workers may then need further education and training for specific skills related to the particular manufacturing subsector or occupation. Employers are having a difficult time finding workers with strong technical competencies in a number of occupations. Workers with advanced skills are also in high demand and are critical to a company's survival or growth prospects.

In follow-up meetings with businesses who participated in our survey, we learned that many have open positions that go unfilled for 6-18 months because of the lack of qualified candidates. Some commonly recruit applicants from other states where relevant vocation education/training programs exist. Some expressed frustration about certain local training programs that no longer exist - - that they have depended on for years.

Training

Policy research shows that "sector training" programs that link workforce training opportunities to in-demand occupations in growth industry sectors can have substantial impacts on the employment prospects and earnings of those who participate in training.

Overall, 72% of the employers surveyed said that they believe there is a need for new or more effective pre-employment (or soft skills/work readiness) training.

Most manufacturers think that "public investment in education and training" should include providing young people with more opportunities to learn work readiness skills, to cultivate a good work ethic, and to have opportunities to explore skilled trade crafts through shop classes, vocational training programs, and work experience opportunities.

Most employers responding to the survey were also interested in job-specific training for their company or subsector that would address their workforce needs.

Recommendations

1. Target veterans through outreach and by working collaboratively with veterans' organizations as veterans offer both foundational and technical skills needed by the manufacturing sector
2. Convene a Skills Panel (with sub-panels for the five key subsectors) to assess the Priority and Demand Occupations and their need for new or improved local training programs
3. Collaborate with educational and business/industry partners to provide Pre-Employment and Certificated Work Readiness Training to address employability and foundational skills
4. Focus training resources on key manufacturing subsectors and on Priority and Demand Occupations and career pathways leading to those occupations
5. Expand business outreach and engagement activities and knowledge base of service-providing WDB and One-Stop Center staff to improve their understanding of the manufacturing sector's workforce needs and business characteristics
6. Improve the promotion and marketing of WDB, SBDC, and One-Stop Centers so that business and industry has a better understanding of the services available to employers
7. Collaborate with educational and business/industry partners to promote to the younger generations an awareness of career pathways in manufacturing, including STEM careers

Appendix A: Workforce Needs Assessment Survey Instrument

Workforce Needs Assessment for the Advanced Manufacturing Sector in Contra Costa County

This confidential workforce needs assessment is being conducted by Jim Cassio & Associates on behalf of the Workforce Development Board of Contra Costa County. ("Confidential" means that survey participants are not publically identified.)

Please complete & return this questionnaire by:

Options for completing/returning this questionnaire:

By Fax: 916-405-3625 (please retain original)

By Email: jimcassio@gmail.com

By Mail: 198 Willow Creek Dr, Folsom, CA 95630

Or Call: 916-320-4944

Your contact information:

Your Name: _____

Title: _____

Company: _____

Address: _____

_____

Phone: _____

Email: _____

Initial Questions

I. Is your business engaged in manufacturing related activities – regardless of where the production is done? ☐ Yes ☐ No

If NO, please return the remainder of the questionnaire unanswered. Thank you.

II. If YES, please list your East Bay locations city by city, and note the primary function for each location (e.g. production, R&D, sales, distribution, HQ):

	East Bay Locations	Primary Function
a)	_____	_____
b)	_____	_____
c)	_____	_____

III. If your production is **not** done in the East Bay, where is it done?

IV. If your production is done in the East Bay, do you use **Advanced Manufacturing** in the production of your products?
Definition: Advanced Manufacturing creates products using innovative technology and/or advanced materials.
☐ Yes ☐ No

If YES, please skip to page 2 and complete the remainder of the questionnaire.

V. If NO, have you considered the use of **Advanced Manufacturing** in the production of your products and, if so, what was your assessment or conclusion?
Note: After responding to this question, please return the remainder of the questionnaire unanswered. Thank you.

1. What are your plans to run and grow your business in the next 2-5 years and what is your most significant barrier to achieving your goals? *(If your focus is on growth, please note how you measure "growth" – i.e. jobs, output, profits, etc.)*

2. How many employees do you currently have working at locations **within Contra Costa County**? _____

3. Of those **current** employees, about what percent are:

Full time regular	Part time regular	On Call	Temporary (But Not Seasonal)	Seasonal	Independent Contractors
%	%	%	%	%	%

4. About how many employees do you expect to have working:
   6 months from now: _____ 1 year from now: _____ 3 years from now: _____

5. How many current job openings do you have, and for what jobs?

6. What recruitment methods do you use most often to find prospective job applicants?

7. Overall, about what percent of the candidates who apply for your open positions meet your minimum requirements? _____

8. If you are you having difficulty recruiting qualified workers for reasons other than a lack of specific skills and experience, what are some of the biggest challenges you encounter?

9. What jobs will make up the most **new positions** over the next 3 years, and how many new jobs do you expect to add?

	For what jobs?	How many of these jobs do you expect to create?
d)	_____	_____
e)	_____	_____
f)	_____	_____
g)	_____	_____
h)	_____	_____

10. For what jobs do you expect to hire the most **replacements** when current employees retire or leave your company over the next 3 years, and how many replacements do you expect to hire?

	For what jobs?	How many replacement workers do you expect to hire?
a)	_____	_____
b)	_____	_____
c)	_____	_____
d)	_____	_____
e)	_____	_____

11. For what jobs do you have **significant difficulty** finding qualified applicants, and why?

	For what jobs?	Why the difficulty finding qualified applicants?
a)	_____	_____
b)	_____	_____
c)	_____	_____
d)	_____	_____
e)	_____	_____

12. Considering employees you have recently hired, what specific knowledge, skills, abilities or personal characteristics are lacking?

	For what jobs?	What qualities are lacking?
a)	_____	_____
b)	_____	_____
c)	_____	_____
d)	_____	_____
e)	_____	_____

13. Do you see a need for new or more effective **pre-employment** (or soft skills) training - designed to better prepare your new hires for entry level jobs? ☐ Yes ☐ No
14. If YES, please describe the type of training you believe is needed and for what job classifications:

15. Do you have **existing** employees with skill needs that may require new or updated training? ☐ Yes ☐ No
16. If YES, please describe the type of training you believe is needed and indicate for what job classifications:

17. What **outside** training do you currently utilize and how satisfied are you with it?

18. What could public investment in education and training do to assist you in recruiting or training qualified workers, or in training existing employees?

19. What are the positions you have that are **critical** to your use of Advanced Manufacturing?

Entry Level – requires less than a Bachelor degree	
Entry Level – requires a Bachelor degree or higher	
Non Entry Level – requires prior related experience	

20. Would you be interested in working with our workforce development board and with other employers in your industry on an "Industry Sector Strategy" designed to improve the quality of your sector's workforce? ☐ Yes ☐ No ☐ Maybe

Thank you for participating in our Workforce Needs Assessment!